VIRTUAL COMMUNITY

IN

ONLINE MULTIPLAYER

BOARD AND CARD GAME SITES

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ABSTRACT

Board and Card Game (BCG) sites allow people to connect over the Internet to play virtual versions of games, like Chess or Canasta, that can be played on a physical table. Many of these sites are successful as they have large memberships, are extremely active, and persist for a long time. However, when analysing the BCG site PlayOK, I found that the community did not exhibit behaviours traditionally associated with successful community: there was little verbal communication; most interactions were impersonal and once-only; and the player population was highly transient.

The problem is that *designers and researchers have a poor understanding of the characteristics of BCG communities, and how those characteristics are affected by factors that are typically seen as important for community such as size and leadership*. In this thesis, I improve understanding of BCG site communities through three studies:

1 No research describes community behaviour in BCG sites. I analysed community behaviour in the PlayOK BCG using 'social accounting' methods, which generate summary behavioural statistics from log traces. I found that players were motivated by wanting an opponent, without being concerned with the opponent's identity.

2 The effects of community size on BCG community behaviour are poorly understood. I used social accounting analyses to compare a small site (GameCenter), with the large PlayOK site. I found that the smaller GameCenter exhibits very similar behaviour but is less efficient due to the smaller population.

3 There are no empirical studies of the role of leadership in online game communities through a substantial change in leadership. I used social accounting techniques to analyse GameCenter BCG before and after a substantial change in leadership. I found

that sub-communities responded differently according to how they relied on the leadership for their core activities.

This research is the first to identify a type of community that is sustained through impersonal, non-verbal interactions. This important because examples exist in BCG sites and may exist as sub-communities in other settings such as online discussion forums, social media sites, and other online games.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1
INTRODUCTION

There are many virtual places on the Internet that support groups of people interacting with each other, such as discussion forums, chat servers, and social media sites, and they often try to build a community amongst their participants (Blanchard & Markus, 2002; Ginsburg & Weisband, 2002a; Koh, Kim, Butler, & Bock, 2007; Lampe & Johnston, 2005; Mamykina, Manoim, Mittal, Hripcsak, & Hartmann, 2011; Muramatsu & Ackerman, 1998; Williams et al., 2006; Zhu, Kraut, & Kittur, 2012). These *virtual communities* are valuable to the members because they provide desirable community functions – such as socialising, building and maintaining relationships, emotional support, feelings of membership and belonging, and information exchange – for people that may otherwise be separated or isolated by distance. They are also valuable to the owners of the sites as the community's activity generates informational and social resources, attracting new people and helping to retain existing members, which maintains the site and helps it grow. Virtual communities are a prominent cultural phenomenon in today's society (Blanchard, 2008b; Ellonen, Kosonen, & Henttonen, 2007): for example, (Hsiao & Chiou, 2012) report that 84% of United States Internet users participate in at least one virtual community, and the numbers are likely similar in other countries where Internet usage is high.

Some of the Internet's virtual places support online multiplayer games. These game sites (I use the term 'site' to include Web sites and Internet servers) provide opportunities for people to interact socially with others, both through playing games together and through verbal (usually text-based) communication. The persistence of the site over time also provides opportunities for longer-term connections as people may play or chat regularly with particular partners, form new friendships, or associate with subgroups. These properties allow communities to form, which positively affects the quality and success of the game sites. For example, at the Internet Chess Club (ICC), community volunteers help other members, and grandmasters record their games for other members to study (Ginsburg & Weisband, 2002a). These actions, and others like them, support the community members and create information resources for them, making a more enjoyable and valuable place and benefiting both owners and members.

There are many types of online multiplayer game sites, and considerable research has been carried out on virtual communities in these places, e.g. (Cheung & Huang, 2011a; Ducheneaut,

Moore, & Nickell, 2007; Ghuman & Griffiths, 2012; Williams et al., 2006). One type that has been neglected in the literature, however, is Board and Card Game (BCG) sites. These game sites feature online reproductions of turn-based board and card games such as Chess, Go, and Bridge. They typically have simple interfaces, without the complex 3D virtual worlds present in more recent games such as First Person Shooters or Massively Multiplayer Online Games.

Board and Card Game sites are important to study because they include many large and long-lived game communities. Simpler technical requirements mean that the game implementations do not need the latest computing hardware or the best network bandwidth, and so many BCG site communities are long-lived in comparison to other games. For example, the Internet Go Server (http://pandanet-igs.com) has been online since 1992. The size and longevity mean that they can be more economically valuable for owners and can provide more social and information resources for community members. However, little is known about how a BCG site may become large, old, or wealthy. Knowing more about virtual communities in BCG sites is valuable for designers who wish to create or maintain one of these sites. For example, knowing more about the fundamental behaviour of the communities allows designers to direct their efforts to support those behaviours, and knowing more about the effects of social structures like leadership can help designers to plan for organisational structure.

In order to better understand BCG communities, I obtained log data from two successful BCGs: PlayOK, which has been online since 2001 and has over 5 million registered users; and GameCenter, which has been online since 2007 and has about 4000 registered users. The log data from both sites contains information about the actions of the site members, including logins and logouts, movement through the sites' virtual spaces, and interaction through chat messages and games. This log data provides a basis for exploring community structures such as leadership and relationships, and social behaviours such as conversations and shared activity, in two successful BCGs.

This dataset is, to my knowledge, the first of its type – part of the reason that so little is known about BCGs is that it is difficult to obtain data. The sites are privately owned and independently developed, and many BCG site administrators are not inclined to engage with researchers. With this data in hand, however, several analyses are possible that can help understand the characteristics of these particular types of online communities, help determine whether they look and behave like other types of online communities that have been studied in previous work, and help examine the influence of conceptual factors such as size and leadership.

Problem

This thesis addresses the problem that *designers and researchers have a poor understanding of the characteristics of BCG communities, and how those characteristics are affected by factors that are typically seen as important for community such as size and leadership*. Designers do not understand whether the communities function in similar ways to other virtual communities. Although research about virtual communities is rich and active, e.g. (Blanchard, Welbourne, & Boughton, 2011; Hsiao & Chiou, 2012; Koh et al., 2007), BCG sites, while similar in many ways, differ by adding the extra element of shared gaming activity to the interaction. This means that people are not just talking, as in forums and chat rooms, but also "performing" their relationships (Brown & Bell, 2006).

Poor understanding of BCG communities means that there is no information about what the communities look like with regard to fundamental aspects of community behaviour such as permanence of members, social interaction patterns, and formation of relationships (Erickson, 1997; Hillery Jr, 1955; Jones, 2006; Rheingold, 1993a). Also unknown is whether BCG communities resemble other types of virtual communities or have unique characteristics. There are also many community properties, such as size and leadership, that have been identified in the literature as major factors in the success of virtual communities, but it is unknown what role these play in BCG communities.

This problem is important to study because, without understanding the characteristics of BCG communities, designers are unable to plan appropriate support for BCG interaction patterns and social structures. Currently there are few successful BCGs and based on my interactions with experienced BCG members and founders[1], it is more common that new sites are short lived. While some failures can be attributed to content – e.g. the games provided are undesirable – others fail despite having desirable content, because there is a mismatch between the design and how the community wishes to behave. There is also the potential for wider application as the lessons learnt about this unstudied type of community may help to understand other types of virtual communities, both in other types of online games and more generally.

Solution

In this thesis, I improve understanding of BCG communities by analysing fundamental properties of virtual communities in BCG sites. These analyses are possible because I have log data

[1] There are no official studies on the success rates of BCG sites.

of community behaviour from two successful BCG sites, recording player information, logins, movement through the site, and chats and games (although not chat content).

I study fundamental behavioural properties of virtual communities that are recognised as important to understanding virtual communities: the virtual place, the group of people, social interaction, formation of relationships, and permanence of membership. These investigations can be summarised in the following questions:

1. What behaviour is exhibited by successful examples of BCG community?
2. How do BCG communities of different sizes compare?
3. What role does leadership play in successful BCG communities?

I carried out three studies that explore these research questions. The studies provide evidence about how two successful BCG communities operate, and provide an initial understanding of the characteristics and behaviour of a poorly understood type of virtual community. Although these analyses may not generalize to all other virtual communities, they will provide the first comprehensive examination of a subtype that is important in its own right.

Characterising a BCG Community

In the first study, I contribute a behavioural description of one BCG community and begin our understanding of what these communities are like. I analyse community behaviour in the PlayOK BCG using 'social accounting' methods (Brush, Wang, Turner, & Smith, 2005a). I use social accounting methods to analyse log traces to extract basic data about a site – such as number of people, games per person, and chats per game – and use this basic data to generate summary statistics relating to permanence, social interaction, and forming relationships. This analysis produces a characterisation of a BCG community, contributing to the first question listed above. It also provides insight into how some BCG communities differ from other virtual communities reported in the literature.

The problem addressed in this study is that there is no research that describes community in BCG sites. This means that designers and researchers have no basis for understanding the characteristics of these online communities and whether they look and behave like other types of online communities.

There is research into social interaction in online games but it either focuses on issues of social interaction in game sites rather than the community as a whole, e.g. (Ginsburg & Weisband,

2002b; Wright, Boria, & Breidenbach, 2002), or is based on ethnography and interviews, which provide rich but narrow analyses, e.g. (Muramatsu & Ackerman, 1998; Williams et al., 2006). Existing research into social aspects of games, e.g. (Cheung & Huang, 2011a; Muramatsu & Ackerman, 1998; Nardi & Harris, 2006a; Su, 2010; Wright et al., 2002), also focuses on genres other than BCG sites.

Because so little research exists into BCG communities, any investigation of them must start at a very basic characterisation level. Providing at least one example and exploring a model of how the community interacts and forms relationships provides a basis for further research to build upon.

To address the characterisation problem, I analyse log data from the successful PlayOK site to understand the behavioural characteristics of an example BCG community. I use a behavioural definition of community (Jones, 2006), that specifies that communities require:

1. A public virtual place
2. A group of people in the virtual place
3. Social interaction happening between the people in the public virtual place
4. Permanence of site and membership
5. Relationships between people forming

In this first study I describe these properties in the PlayOK community – the virtual place and the group of people – and analyse the behaviour of the community – social interaction, permanence, and relationships. From this analysis I discuss how the community functions and how its characteristics relate to other communities from the literature.

There are other ways of characterising and analysing virtual communities, such as Social Networks (SN), which rely on a network of relationships connecting large proportions of the population, or Sense of Virtual Community (SOVC) definitions, which focus on the members' feelings about their community. The log data is well suited to studying behaviour of the community, but it offers little insight into the internal state of the participants – chat message content is not included and attempts to engage the communities through surveys and interviews did not result in many responses. In addition, early exploration of the data revealed little in the way of social network structures. Given these strengths and limitations, and the fact that so little is known about BCG communities, I chose to focus on the behavioural characteristics.

The main contributions of this study are finding that the community is supported through impersonal and anonymous interactions, the social interactions are based in game actions, and the

game site provides a setting for surface-level sociability. This means that in most cases, players do not care about the particular identity of other players, only that there is someone to play right now. The gameplay is a universal means of communication, removing the need for players to speak the same verbal language, and allowing them to interact sociably without deep discussion. This means that there are very low barriers to entry and the flexibility for different levels of social engagement with others, which encourages large numbers of people, meaning that there is always someone to play against.

Effects of Population Size

The second study extends understanding of BCG communities by analysing the characteristics of another site. By comparing the second site to the first, this study also allows some insight into the effects of community properties on the behaviour and success of the site. The primary difference between the sites is population size, so the study focuses on that factor.

I use the same social accounting analyses to look at a much smaller site (GameCenter), and compare this community with the larger PlayOK site. This analysis primarily contributes to the third question listed above as it shows how BCG communities are influenced by a substantial difference in population size. As with study 1, it also contributes to the first and second questions, refining the characterisation of possible BCG communities.

The problem addressed in the second study is that there is little understanding of how community size affects basic behavioural characteristics of a BCG community. Analysing PlayOK resulted in a better understanding of one type of successful BCG community. However, without comparison to other communities, it is impossible to judge the influence of the various properties of PlayOK. Any analysis of other examples, whether the same or different, adds to understanding of BCG communities.

Having some understanding of how different properties of the community affect its behaviour is important because it allows designers to design for particular types of community and allows site administrators to better manage the current community.

I have log data from the BCG site GameCenter with very similar information as the log data from PlayOK. I perform the same social accounting style analyses on GameCenter – social interaction, permanence, and relationships – and compare the two sites.

While the two sites are very similar in purpose – to provide a virtual place for people to play board games – they also differ in many details. The main difference between the two sites is

population size – during the logging PlayOK had nearly 3,000,000 users while GameCenter had about 2,000. I perform the same analysis on GameCenter as in the first study on PlayOK, investigating social interactions, permanence, and relationships, and compare the results from the two sites.

By analysing GameCenter I characterise the behaviour of another example BCG community and how it compares to other virtual community types from the literature. In addition, by looking at the differences between such factors as design of the virtual place and differences in the site community, I gain some insight into how these factors influence the community.

The main contributions of this second study were to show that the smaller GameCenter community demonstrates very similar behaviour to the large PlayOK community, and interactions are mostly impersonal and anonymous. However, the smaller population means that there is not always an opponent available, resulting in lower membership persistence.

Leadership

The original purpose of collecting data from GameCenter was to make a comparison with PlayOK. However, during data collection, the founder of GameCenter, who was also a very active participant and the only formal leader, substantially reduced his involvement with the site to pursue other interests. The result was that I had game logs before, during, and after a substantial change in leadership on a BCG. This presented an opportunity to study the effects of a factor (leadership) that has been identified as a primary influence in virtual communities, e.g. (Koh et al., 2007; Mamykina et al., 2011; Zhu et al., 2012).

Leadership is often proposed as a crucial factor in successful communities. In order to examine the effects of strong leadership on the characteristics and behaviour of a BCG community, I again use social accounting techniques to analyse the GameCenter BCG before and after a substantial change in leadership to see how the community changes and adapts. This chance event represents a unique opportunity to examine the effects of a leadership change that occurred "in the wild." This study will examine the effects of one clear real-world example of a change in leadership.

The problem I address here is that there are no empirical studies of the role of leadership in online game communities through a substantial change in leadership. Existing studies of leadership in virtual communities have taken a relatively static view of the community and there is no work that analyses a community through a substantial change in leadership. Studies discussing leadership in game communities exist, e.g. (Ducheneaut, Yee, Nickell, & Moore, 2007; Muramatsu & Ackerman,

1998), but they are based on interviews and ethnographic data, which gives a rich but narrow view, and again a static view of leadership.

Previous research has suggested that leadership is a major influence on sense of community (Blanchard & Markus, 2002; Koh & Kim, 2003; Koh et al., 2007). Leaders set the tone for the community, especially when the community is forming (Mamykina et al., 2011; Williams et al., 2006). Studying leadership in a community before, during, and after a major change in leadership in an online game community shows the role of that leadership. The study also provides insights into how the community recovers from such a change.

I analyse the log data to look for changes in the community's behaviour in terms of the components of the behavioural model described earlier – permanence, social interaction, and relationships. In addition, I interview a small sample of long-term members of the community to gain a deeper insight.

I first analyse whether the founder's activity has substantially decreased (as he reported) by looking at his activity in terms of time logged in, chat messages sent, and games played over the time of logging. I also analyse leadership activities before and after the founder's withdrawal to see how the community adapted. The presence of leadership activities afterwards would indicate the presence of shared leadership (Zhu, Kraut, Wang, & Kittur, 2011) where site members take on leadership tasks despite not being in formally appointed roles.

This study provides new understanding of the role and importance of leadership in online communities, and provides designers with an empirical foundation as they seek to develop and support online groups. It addresses the question of the role that leadership plays in a successful BCG community.

The study also contributes design guidelines for effective leadership strategies to increase the success of BCG game sites. These guidelines will provide information for designers of BCG sites on the benefits that leaders can bring to the site, and ways of managing leadership roles.

The main contribution of this study is to show that the influence of leadership is not uniform. Subgroups in the community were influenced differently according to their reliance on the activities of the leader, and to the degree to which leadership activities were distributed to other members of the community. In some cases, subgroups showed strong resiliency in the face of the loss of leadership. This research helps designers to understand the complexities of leadership in online communities, providing an important foundation for developing and supporting online groups.

Conclusion

I have opened up a new area of research in this thesis – virtual communities in Board and Card game sites. I did three sections of work to provide a foundation for the area. In the first section of work, I characterise the behaviour of a successful BCG using a behavioural definition of community that includes the virtual space, the people, permanence, social interaction, and forming relationships. In the second section of work, I characterise a second BCG community and compare it directly with the first. The two sites differ in a number of minor ways, but also differ markedly in size. In the third section of work, I investigate the role of leadership in a successful BCG. By comparing the BCG community before and after a change in leadership, I gain insight into the role of leadership.

Through these three sections of work, using the data from two successful BCG communities, I am able to provide a foundation for this new area of research. I provide a characterisation of how at least some BCG communities function, and compare them with other types of virtual community that have been studied previously. I also investigate the roles that some properties of the sites, such as size and leadership, play in the community behaviour.

Contributions

The main contribution of this research is to provide the first characterisation and analysis of a previously unstudied but important type of virtual community. The new understanding is targeted at designers to aid in building and maintaining BCG virtual communities. The contribution is accomplished by analysing the data from the two BCG sites PlayOK and GameCenter. These two sites provide examples of success in BCGs and can provide useful insights for designers. There are three parts to this contribution:

1. I have identified fundamental community properties of successful BCGs identified through exploration of PlayOK and GameCenter. These properties were: informal interaction; action based socialising; and sociable interaction.
2. I have identified primary influence of the size of the community, which is that it is harder to maintain the impersonal interaction in smaller communities.
3. I have identified some primary influences of leadership, which are that an active leader can encourage a more traditional sub-community but that sub-community can become dependent on the leader.

In the discussion (Chapter 7) I discuss these studies inform design of communities. In this discussion I apply the lessons learnt from BCG sites to other communities, online and offline, and report on some design guidelines. For example, I suggest that communities can be sustained by informal and transient memberships, and supporting multiple levels of engagement can ease transitions into and through the community.

This dissertation also has three minor contributions:

1 The two datasets, which can be of value to other researchers. As I discovered, it is difficult to obtain data from BCG sites. These sites are similar enough for comparison and yet have some interesting differences.
2 Techniques for visualising community activity
3 Mapping behavioural community definitions to social accounting metrics

Structure of the Thesis

The next chapter (Chapter 2) introduces virtual community research and then focuses on research into social behaviour in virtual game-based communities. The remaining chapters are organised as follows:

- **Chapter 3** describes the two BCG sites, PlayOK and GameCenter, as well as the social accounting methods used to analyse them.
- **Chapter 4** describes the analysis of PlayOK, and using the analysis results to characterise this example BCG.
- **Chapter 5** uses the analysis metrics of Chapter 4 to compare PlayOK and GameCenter – two similar BCGs that vary widely in population size.
- **Chapter 6** returns to log file based analysis to explore the role of leadership in the wild in the GameCenter BCG.
- **Chapter 7** discusses the main results of the studies, using these results to create some dimensions of a framework, and suggest design guidelines.

Chapter 8 concludes the thesis with a brief summary, list of contributions, and suggestions for future work.

CHAPTER 2
RELATED WORK

The purpose of this chapter is to discuss research on virtual communities in online multiplayer games. While there has been little work applying virtual community theories directly to online multiplayer games, there has been a lot of research concerning social interaction in games. The chapter is structured as follows:

- First I define how I use common community terms – necessary because there is often confusion related to definitions of community;
- Second I provide an overview of virtual community research, focusing on three general research streams – basic community requirements, social networks, and sense of virtual community;
- Third I describe some of the different types of games, the types of people who play them, and the methods that have been employed in studying online multiplayer games.
- Fourth and finally, I describe the different types of social grouping that occur in online multiplayer games and explore the connection from these social groups and community constructs.

Definition of Terms

There are many terms that are used in relation to virtual communities. Definitions of these terms are sometimes vague and often contradictory. To avoid confusion, I establish here the terms that I will use and how I use them throughout this document.

- **Group**: I will use "group" in a general sense to refer to a collection of people, of any size, that may or may not be related to each other.
- **Community**: Defining "community" is problematic. (Hillery Jr, 1955) survey of definitions noted over 90 different definitions of community. The only universally agreed upon element was that communities have people. The most common non-universal element was the presence of ties between the people.
- **Physical or Real-World Community:** A physical or real-world community (I use both terms interchangeably) is a community where most of the interaction is not

online, though online interactions can certainly support the community. These communities often have ties to a geographical location.

- **Virtual Community**: A virtual community is a community that primarily interacts online. Research into virtual communities is about the ties between members, what form they take, and what impact this has on the community behaviour. I discuss the definition in more depth below.
- **Population**: A group that is the set of all users within a particular online system. This may be larger or the same size as a virtual community. For example, there is the population of Facebook users, which contains more than one virtual community.

Virtual Communities

Howard (Rheingold, 1993b) book "The Virtual Community: Homesteading on the Electronic Frontier" was the first publication to bring virtual communities to the attention of the mainstream and social science researchers (Blanchard, 2008a). It is worth quoting his definition of virtual community:

> *"virtual communities are social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace" (page 5)*

While this informal definition is appealing, there are many ways to define virtual communities. Most commonly they are defined as groups of people that communicate primarily online and are connected in some way (Driskell & Lyon, 2002). However, this is a very general definition and virtual community research investigates the nature of these connections between people. The connections can be person to person or people can relate directly to the community (Ren, Kraut, & Kiesler, 2007). Some definitions start with the idea that a group of people is a community if they have a sense of community, e.g. (Blanchard & Markus, 2002; Koh & Kim, 2003).

Definitions of virtual communities are so contentious that there is some debate as to whether there is such a thing as a virtual community. Can ties to a virtual place and between people that have never met in person be strong enough to qualify as a community?

Is There Such a Thing as a Virtual Community?

Virtual communities differ from real world communities. The most obvious difference is that, while real world communities are tied to geographical areas, virtual communities are limited only by communication media. It is this difference that is at the heart of the debate about whether virtual communities are actually communities. Definitions of physical communities usually feature ties to geographical locations as a core requirement. Geographical communities stem from Tönnies' 1887 original work *Gemeinschaft und Gesellschaft* (usually translated as Community and Society – see (Tönnies, 2002) for a translation), and geographical location persists as a fundamental property through (R. Park, 1936) seminal work. Most definitions of (non-virtual) communities also include properties of common ties and social interaction between community members (Hillery Jr, 1955). The geographical co-location forms a basis for the common ties as it means the people share deep commonalities of lifestyle and situation that mean they face the same challenges and issues, and have a common ground for relating to each other. It also means that their social interaction is frequent and deep.

(Driskell & Lyon, 2002) argue that these three properties – shared geographical location, common ties, and deep social interaction – are not fulfilled in a virtual setting. They point out that a virtual group shares no location, and they argue that the virtual common ties are not strong, so social interaction is shallow. They contend that if a social problem arises in a virtual group, it is often easier to simply leave the group than to solve the issue. This is in contrast to a geographically collocated community, where there is a high cost associated with leaving the group and so there is more incentive to resolve issues. Their conclusion is that there cannot be such a thing as a virtual Gemeinschaft community, though they acknowledge the possibility of weaker "Gemeinschaft-like" communities online.

In contrast, (Wellman & Gulia, 1999) dismiss the majority of the arguments that contrast virtual communities unfavourably with geographically-based communities as being tied to a "pastoralist myth" of communities. They argue that this model of community has not existed for a long time, as technologies such as telephones and fast travel have enabled geographically distributed communities for a long time, and while the Internet and World Wide Web have enabled new expressions of community, the fundamental social structures are the same. Their contention is that virtual communities are extensions of existing communities expressed in a new medium.

Hinted at in the (Wellman & Gulia, 1999) work and later fully expressed by (Hogan & Wellman, 2011) is the idea that the Internet has enabled people to participate in a wide range of

partial communities simultaneously. A single person may relate to different real-world communities such as workmates, old school friends, and a sport club; they can also be members of virtual communities such as email list, an online discussion forum, or a game guild. These kinds of distributed weak ties existed before the Internet, but the Internet has encouraged them.

There has been a lot of debate on whether there are such a things as virtual communities, and, if so, how to define them. As with non-virtual communities, there are many definitions. However, regardless of which side of the debate researchers take, everyone agrees that there are interesting social phenomena occurring online. In this document I discuss the research that assumes these interacting online groups are in fact communities, and addresses how the members are connected and how they interact.

Why Study Virtual Communities?

Virtual communities are valuable both to owners and participants of multiuser sites. They are valuable to the owners as communities help attract and retain people, and so the site remains active and thrives – especially valuable for commercially oriented sites (Blanchard & Markus, 2002). They are valuable to the members as communities provide informational and social support to members (Arguello et al., 2006; Blanchard et al., 2011; Preece, 1999).

To state this another way, virtual communities create virtual capital (Ginsburg & Weisband, 2002a). Virtual capital is the value in the community from its members and activity. When someone leaves the community that person loses the information and support that they were getting from the community and the community loses the knowledge and social activity that the person was contributing. Virtual capital contributes to a sense of belonging to the community (Damásio, Henriques, & Costa, 2012). Knowing how to build communities with strong virtual capital is valuable to both the community site owners and the community members.

What is a Virtual Community?

There are many ways of perceiving virtual communities. However, they can be broadly organised into three categories. The first is a behavioural definition, focusing on the basic requirements for community, such as having a stable group of people that form relationships by interacting with each other.

The second is the Social Network approach. The population is represented as a network with each person as a node and the social relationships between them forming the network links or

edges. Communities are defined within the network as the "clumps" of people that are more closely related.

The third category, while still considering relationships between individuals, also takes into account how the people feel about the community itself. The feeling arises through shared context, such as following a sports team or having experience with particular health issues. I have incorporated three major theories into this view – Social Identity Theory, Common Identity and Common Bond Theory, and Sense of Virtual Community (SOVC). I have organised them into SOVC categories, using it as a unifying structure.

In this thesis I rely most upon the naïve definition, as it is most suited to initial characterisation of an unknown type of virtual community. However, I also describe the other two approaches in some detail here, as they are important to understanding the bigger picture and where this work may go in the future.

Behavioural Definition of Community

If we think about virtual communities we can, despite the arguments over definitions, still arrive at some (mostly) uncontentious basic requirements. By using these requirements as the basis for analysis, researchers are able to avoid theory-laden observations to some degree.

The list of requirements starts with a group of people, which everyone agrees upon (Hillery Jr, 1955; Jones, 2006). Further requirements come from informal definitions such as Rheingold's, introduced at the beginning of the section:

> *"virtual communities are social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace"* (page 5)

From this quote come the added requirements that virtual communities are online, involve interactions, lead to personal relationships, and exist over a sustained period of time. Other sources that provide fundamental requirements of virtual communities have very similar lists, e.g. (Erickson, 1997; Jones, 2006). They can be summarised as: a group of people; a public virtual place; social interaction; relationships; and permanence.

A Group of People: This requirement is common to all communities, physical and virtual. In (Hillery Jr, 1955) survey of community definitions, the only common point of agreement was that

the community required a group of people. A group must be of a certain size to create a community, though the exact number is determined by context and possibly only known in hindsight.

A Public Virtual Place: In most definitions of physical community, the group of people are tied to a physical place, e.g. (Hillery Jr, 1955; R. Park, 1936; Tönnies, 2002). A similar situation exists for virtual communities, which are associated with virtual places. The place is public in the sense that it allows multiple people to interact with each other at once, not necessarily that access is unrestricted.

Social Interaction: For a community to be considered successful, multiple members of the group of people need to be using the capabilities of the public place to interact with each other. The exact amount of interaction required for success depends on the particular community. Group interaction in virtual communities is usually text-based. Different time scales of interaction exist, ranging from the (usually) rapid back and forth of chat messaging to posting on comment boards.

Relationships: Based on repeated social interaction with each other, community members form relationships. Relationships can be expressed through varying degrees of online intimacy (Pace, Bardzell, & Bardzell, 2010), and often extend to include offline events and activities (Koh & Kim, 2003).

Permanence: To support the community and building relationships, there needs to be some stability in the environment. Permanence refers to the two basic elements of the virtual community – people and place. The place needs to have permanence as it forms the basis for the community and provides a consistent virtual location for the members. There needs to be some persistence in membership to provide a basis for relationships to form over time as people see the same others when they arrive at the place. However, there is evidence that some virtual communities benefit from turnover in membership as it provides evidence that the community is "alive" (Dabbish, Farzan, Kraut, & Postmes, 2012).

This perspective on communities is often taken by researchers who are most interested in basic social behaviour of a large population, e.g. (Brush et al., 2005a; McEwan, Gutwin, Mandryk, & Nacke, 2012). It is also more amenable to analysis of large amounts of automatically collected data, such as log files. Low-level traces of activity – such as logging events – can be used to reconstruct community behaviour through counting and obtaining summary statistics of user actions. For example, Brush, Wang, Turner, & Smith (2005) analysed Usenet newsgroups to calculate such statistics as average number of visits and average actions per visit. They used the information to determine message-viewing patterns amongst users with different rates of participation.

Communication is the primary activity amongst online communities, and hence is the primary focus of most community research. Analysis of the text can lead to insights on such topics as the characteristics of community members that fill certain roles, e.g. leaders (Cassell, Huffaker, Tversky, & Ferriman, 2006), the characteristics of successful messages (Arguello et al., 2006), or how to improve design for certain types of communities (A. Xu & Bailey, 2012).

There is a danger inherent in this approach however as some researchers, e.g. (Blanchard, 2008a; Jones, 2006), claim that, while these properties are required for communities, they are not sufficient, leading to the Sense of Virtual Community approach. Despite this limitation, the requirements are a necessary starting point for community analysis.

Social Networks

In Social Networks ties between people are assumed to be explicitly defined social relationships. The population is represented as a network structure, with each individual represented as a node, and the social relationships between them as connections. The connections represent social relations that make sense for the context; for example, a blog social network may use trackbacks (Chin & Chignell, 2006), or an instant message network may use messages sent (Leskovec & Horvitz, 2008). Within the Social Network communities are groups that are more related to each other than to others in the network (a simple example of how this might work is shown in (Newman & Girvan, 2004) and illustrated in Figure 1). This reflects the definition that virtual communities are defined by ties between community members (Driskell & Lyon, 2002).

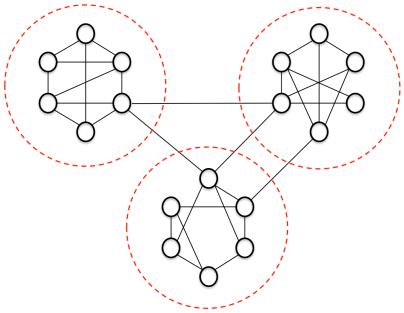


Figure 1: A small sample Social Network with communities circled. These are 3-core communities (from the community definitions listed later)

While Social Networks have been used for a long time as a way of studying social community structures, Social Network Analysis (SNA) techniques have gained popularity more recently through the use of computationally intensive analyses (Burt, Kilduff, & Tasselli, 2013). The

techniques are especially useful for analysing virtual communities, as logging can automatically collect much of the information about social interactions. SNA algorithms are good at identifying and describing the structure of certain types of virtual communities within a population. In this section I give a brief and simplistic overview of a large and complex topic; for a full introduction see (Wasserman & Faust, 1994).

SNA techniques consist of two broad types of analyses. First there are analyses of network properties, which identify properties of individuals and connections (though they are often presented as statistical summaries of the network). Second there are analyses to identify subgroups or communities within the population network.

Network properties describe individuals or connections and vary widely according to the purpose of the particular analysis. However, there are basic summary statistics to characterise a network, such as the number of people, the average number of steps between any pair, and the largest number of connections between any pair. Some common but slightly more complicated properties (Jamali & Abolhassani, 2006):

- **Maximum flow**: how many different paths through the network connect a pair of people
- **Cohesion**: similar to maximum flow but incorporates the idea that a connection between a pair is stronger if it is shorter
- **Centrality and Power**: this is the importance of an individual in the network, usually made up of the components
    a. **Degree**: number of people this individual knows directly
    b. **Closeness**: how closely connected this person is to everyone else in the network
    c. **Betweenness**: how critical this person is for connecting others
- **Diameter**: the longest shortest path between two community members.

There are two important uses of network properties. They can summarise large and complex networks for ease of understanding, and they can form the basis for algorithms that identify communities within the network.

In Social Networks, virtual communities are defined as subgroups that are more highly connected internally than externally. Thus the problem of identifying communities within a social

network is one of partitioning the network into densely connected subgraphs (Newman & Girvan, 2004).

There are many ways of defining the densely connected subgraphs, and the definition used depends on the purpose of the community analysis and the type of communities being sought. I list a sample of the simpler definitions for illustrative purposes (from (Jamali & Abolhassani, 2006) except where noted):

- **Clique:** All members have direct relationships to all others in the clique. Cliques are very tight-knit, and usually small groups. In graph terminology, a maximal complete sub-graph.
- **N-clique:** Every member is at most *n* connections away from every other. N is usually 2; equivalent to a friend-of-a-friend. N-cliques have been defined because cliques are overly restrictive.
- **N-clan (also known as k-clubs):** N-clans are similar to n-cliques but have an added restriction on the diameter of the community. This helps to overcome an undesirable quality of n-cliques where community members can be connected via non-members.
- **K-core:** Every member of the group is connected to at least *k* other members (Batagelj & Zaversnik, 2003). This makes sure k-core members have a level of familiarity with rest of the community.

Other definitions, such as k-plexes and γ-quasi-cliques (Pattillo, Youssef, & Butenko, 2012), build on the theme of cliques, while others make use of other properties of the network, such as hierarchical partitioning or betweenness (Newman & Girvan, 2004). All of these methods give varying results but all are built on the idea of partitioning the network into communities that are densely connected internally but have fewer connections to the rest of the network. They can be used in complementary ways to gain deeper understanding of the network structure.

The advantage of SNA techniques is that they take into account the entire set of data of large and complex social networks. These networks are frequently of such complexity that analysis is impossible by manual methods. The analysis techniques, while computationally intensive, are automated and hence are much faster than any human researcher. It is also often seen as an advantage that SNA does not rely on preconceived definitions of communities within the structure; rather, any communities are emergent from the relationships between individuals.

The main disadvantage of SNA is that it assumes that communities can be defined by explicit relationships between people, ignoring people's relationships with the community itself. For example, in a community of fans following a sports team, an SNA analysis might focus on the relationships between the fans, while missing that primary element binding them together is loyalty to the team.

The next subsection discusses theories of community that incorporate people's sense of community. In some situations communities found by SNA have been found to correlate with those found by sense of community techniques (Chin & Chignell, 2007).

Sense of Virtual Community (SOVC)

Social networks view a community as a group of people with social ties between them. However, many theories of communities are more complex, incorporating not just ties between people, but also ties to the community itself, based on common context such as beliefs or situation. Theories of community from the social sciences emphasise both of these kinds of ties.

In the field of Community Psychology, physical communities are defined as a group of people who exhibit a *Psychological Sense of Community* (SOC) (Sarason, 1974) – that is, the people are in a community because they have an emotional sense that they are in a community. There are many definitions of SOC but the most widely used is that of (McMillan & Chavis, 1986), which has four dimensions: (1) membership, including aspects of belonging and group norms; (2) influence, including both members shaping the community and the community influencing members; (3) integration and fulfilment of needs, including informational and socio-emotional support; and (4) shared emotional connection, including shared beliefs and goals.

Many researchers, e.g. (Blanchard & Markus, 2002; Ellonen et al., 2007; Koh & Kim, 2003), have worked to extend SOC to define a *Sense Of Virtual Community* (SOVC). This work has discovered fundamental differences between SOC and SOVC, for example (Blanchard, 2007) found that in a virtual setting there was more importance attached *exchanging support* and *identification*; and (Koh & Kim, 2003) emphasised the importance of enthusiastic leadership as well as offline encounters.

(Ellonen et al., 2007) uses a variety of SOVC sources – (Blanchard & Markus, 2004; Koh & Kim, 2003; Roberts, Smith, & Pollock, 2002) – to identify seven SOVC dimensions:

- **shared emotional connection**: the degree to which someone's personal beliefs and goals align with those of the community;
- **membership feelings**: the degree to which someone perceives that they are part of a community;
- **immersion**: how immersed someone is in the community;
- **influence**: the ability of a person to change the environment around them;
- **identity and identification**: how people represent themselves and how these representations are perceived by others;
- **support**: socio-emotional and informational support provided by other community members;
- **personal relationships**: the degree to which participants form connected relationships with one another.

SOVC dimensions are mostly about the internal state of the members and so the most direct way to find out if people feel they are part of a community is to ask them. There are structured questionnaires with fixed answers, free form online surveys, and interviews. It is easier to process answers from questionnaires, but free form answers can give more depth (one interesting example was to ask for narratives of experiences (Ellonen et al., 2007)). Interviews are even more work to analyse and usually only target a small number of people, but can give the greatest opportunity for exploring in depth.

The ideal structured questionnaire would be a validated psychology measure for Sense of Virtual Community (SOVC). In the absence of such a measure some studies have used a validated Sense of Community (SOC) measure, e.g. (Abfalter, Zaglia, & Mueller, 2012; Damásio et al., 2012). Many other studies draw upon a variety of sources to create their own surveys, e.g. (Koh et al., 2007; Tonteri, Kosonen, Ellonen, & Tarkiainen, 2011). However, (Blanchard, 2007) argues that there are significant differences between SOC and SOVC that demand new measures. She has done some work to formulate a standardised measure of SOVC (Blanchard, 2007, 2008b). However, this measure is not yet been completely validated through multiple studies.

The advantage of questioning techniques is that they provide insight into the internal feelings of community members. The disadvantage is that the response is from a small sample of the community. In addition that sample is self-selected, which can restrict generalisation of results.

Leadership in Virtual Communities

Community members have many different styles of participating, a perspective which is reflected in virtual community studies. The most common initial division is between members and formal leaders. These categories are easily differentiated because they have extra privileges with the community's environment – e.g. (Mamykina et al., 2011; Zhu et al., 2012) – though in some cases community leaders are identified from the perceptions of the community members, e.g. (Blanchard & Markus, 2004).

Members are often further subdivided by their participation levels. The most basic division is into participants, who make contributions, and lurkers, who only consume from the site, e.g. (Blanchard & Markus, 2004). These can also be further subdivided by amount of activity, e.g. (Mamykina et al., 2011) categorisaties Community Activists, who are highly active; Shooting Stars, who were active for a brief time; and Low-Profile Users, who have low but persistent activity.

In this section, I focus specifically on leaders. Leaders are an important part of virtual communities:

> *Given the voluntary social context, community leaders play an important role in developing the necessary social climate to generate community participation. Securing or developing effective community leaders is likely to be a critical success factor for the sustainability of any virtual community.* (Koh et al., 2007)

In virtual communities enthusiastic leadership has shown to have a positive influence on the sense of virtual community (Koh & Kim, 2003) and leader behaviour is often explicitly included in virtual community research, e.g. (Blanchard & Markus, 2002).

What Do Leaders Do?

Team leadership literature most often splits leadership behaviours into task-based and person-based (Burke et al., 2006; Pearce & Sims, 2002). While that literature is about leadership in corporate teams, a context that differs considerably from voluntary online communities, the categories have been successfully applied to a virtual community (Zhu et al., 2012). The high-level categories of leadership behaviour still apply, but the details change in the new context.

Task based leadership behaviours guide members' activities. Leaders encourage desirable activities and discourage undesirable activities in three ways:

- **Transactional** leadership rewards members based on the desirability of their actions (Burke et al., 2006; Pearce & Sims, 2002). The exact form of this style of leadership varies according to the community or team. For example, Wikipedia contributors can be rewarded with "barnstars" to give a visible recognition of work (Zhu et al., 2012).
- **Aversive** leadership relies on coercive behaviour, using intimidation and reprimands to discourage undesirable behaviour (Pearce & Sims, 2002). An example from Wikipedia is sending warning notices about use of copyright material in edits. These notices tended to be abrupt and legal-sounding (Zhu et al., 2012).
- **Directive** leadership concerns giving clear direction to members about their responsibilities (Pearce & Sims, 2002). An example from Wikipedia is the detailed template structure for new articles (Zhu et al., 2012).

In contrast to task-based leadership, person-based leadership activities are concerned with building social structure and encouraging personal development of members. This aspect can be broken down into four sub-categories:

- **Transformational** leadership develops members' personal capabilities so that they can contribute better (Burke et al., 2006; Pearce & Sims, 2002). Due to the voluntary nature of virtual community membership, one of the most important leadership activities is building membership (Koh et al., 2007) and transforming new members into regular members (Koh & Kim, 2003).
- **Consideration** leadership contributes to building and maintaining intra-group relationships (Burke et al., 2006; Pearce & Sims, 2002); perhaps the most important contributions of leaders in voluntary online communities (Koh & Kim, 2003; Koh et al., 2007).
- **Empowerment** leadership activities encourage members to build their own abilities and become self-reliant (Burke et al., 2006; Pearce & Sims, 2002). The effects of empowerment can be seen in when members start to take on responsibilities performed by formal leaders (Pearce & Sims, 2002; Zhu et al., 2012).
- **Motivation** leadership behaviours encourage members to exert effort, especially during hard times (Burke et al., 2006). In a virtual community, enthusiastic participation from

> leaders early in the community's life can set the tone for a motivated community (Mamykina et al., 2011).

The leadership roles discussed above are about directly interacting with members. However, in online communities, a vital role for leaders is building the environment for the community. For example, in communities such as the news site Slashdot (Lampe & Johnston, 2005) and the Q&A site Stack Overflow (Mamykina et al., 2011), the site founders built the systems that display the web pages and manage how members interact.

Formal and Shared Leadership

Many leadership responsibilities can be shared by members other than formally appointed leaders (Pearce & Sims, 2002; Zhu et al., 2012). Peer leaders are members that perform some leadership activities voluntarily – at least those that do not depend on formal privileges. These activities can be task-based, such as one member telling another how to do something on the site, or person-based such as existing members welcoming a newcomer.

However, while shared leadership is effective, formally appointed leaders still have privileges and authority not available to others. Their formal role also confers a measure of authority and so their involvement has more impact (Koh & Kim, 2003; Mamykina et al., 2011; Zhu et al., 2012). Some roles are formal by nature; for example, leaders who build the environment have to be formally appointed as they require special permissions.

Online Multiplayer Games

Communities in online multiplayer games are particularly interesting to study for a variety of reasons. There are the obvious economic reasons – the worldwide video game industry was reported to be worth USD67 billion in 2012 and forecast to grow to USD82 billion by 2017 (Gaudiosi, 2012). Games are also being used by an increasingly wide variety of demographics and in many contexts, such as motivating exercise (Gao & Mandryk, 2011), healthy eating (Orji, Mandryk, Vassileva, & Gerling, 2013), and for team building (Ellis, Luther, Bessiere, & Kellogg, 2008).

In addition, despite being artificial environments, games still provide a setting for studying human behaviour and interaction. Often what we learn about groups in a virtual setting applies in other settings, for example (Lofgren & Fefferman, 2007) discuss the potential of using multiplayer games in epidemiological models to get realistic human behaviour responses and (Dourish, 1998) expresses how games can be used to study interpersonal interaction:

> *"Whether they're in the Corporate Boardroom or the Forest of Eternal Gloom, people are people and they interact in much the same way – and the technologies they depend on are much the same."*

Another reason to study online game communities is that they occupy an interesting place in society and culture. Many have pointed out that the last 50 years has seen a decline in participation in physical world social settings such as clubs, sporting teams, and "third places" for civic interaction, e.g. (Oldenburg & Brissett, 1982; Putnam, 2001). A primary culprit is modern media, such as television and digital games, which tend to be largely asocial. However, multiplayer online games offer a new means for social structures to form through the media that people are using (Williams et al., 2006). In addition, the nature of social interaction in games provides somatic experiences independent of geographical distance (Nielsen, 2010), meaning there is a physical component that would make the interaction as socially relevant as face-to-face. Games add the extra element of shared activity to the interaction, and so people are not just talking, as in forums and chat rooms, but also "performing" their relationships (Brown & Bell, 2006; McEwan et al., 2012).

The purpose of this section is to provide information about online multiplayer games that is necessary as the setting for later discussion of community in games. To this end, the section describes different types of games, how players vary across games, and different methods that have been employed to study community-related aspects of games.

Types of Online Multiplayer Games

The first step is defining what I mean by "online multiplayer game". As with the community definitions in the previous section, definitions of games are contentious. My purpose here is not to enter the debate but simply to be precise about how I use the term and avoid confusion.

Perhaps the most difficult term to define is "game" (Juul, 2003; Malaby, 2007). For the purposes of this discussion I use the definition developed by (Juul, 2003), which draws upon a large body of previous research to arrive at six elements:

- Games are rule based,
- Games have variable, quantifiable outcomes,
- There is value attached to these outcomes,
- Players invest effort to achieve the outcomes,
- Players are attached to the outcomes,
- The same game can be played either with or without real world consequences.
- In addition, in this discussion I add the following two restrictions:
- *Multiplayer* to specify only games that involve multiple people,
- *Online* to specify only games that are Internet based.

These rules mean that the following examples – drawn from (Juul, 2003) – are not considered games: free-form play (no rules); Second Life (no quantifiable outcomes); open-ended simulations (no value on the outcome), watching a movie (no player effort), Conway's Game of Life[2] (player is (mostly) not attached to the outcome), and (physical world) traffic (there are always real world consequences). Rules 7 and 8 also rule out online single-player games, e.g. Tower Defense[3], and co-located multiplayer games, e.g. Wii Sports[4].

However, the discussion will still include Multi-User Dungeons (MUDs/MOOs), Massively Multiplayer Online Games (MMOGs), Multiplayer Role Playing Games (Multiplayer RPGs), First Person Shooters (FPSs), Real Time Strategy (RTS) games, Fighting Games, and online board and card games (BCGs).

[2] http://en.wikipedia.org/wiki/Conway's_Game_of_Life
[3] http://en.wikipedia.org/wiki/Tower_defense
[4] http://en.wikipedia.org/wiki/Wii_sports

In this section I briefly describe the main types of games that are referenced in this review. While there are other types (e.g. multiplayer casual games and Multiplayer Online Battle Arenas), the types described here are those that have had community aspects covered in the literature. The purpose of this subsection is not to enumerate every type of multiplayer game, but rather to provide some familiarity with the games I will be referring to later in the discussion. To use the terminology of the naïve community definition (subsection 0), these are descriptions of the virtual public places of online multiplayer games.

Multi-User Dungeons (MUDs)

MUDs (Muramatsu & Ackerman, 1998) are text-based adventure games set in a persistent virtual world. The virtual world is most often fantasy based, sometimes with generic fantasy settings with creatures such as elves and goblins, and sometimes with specific settings such as Tolkein's Lord of the Rings or Jordan's Wheel of Time. MUDs were important primarily in the days of low-bandwidth connectivity to the Internet, and pioneered the early days of wide-area, Internet based multiperson play (Dourish, 1998).

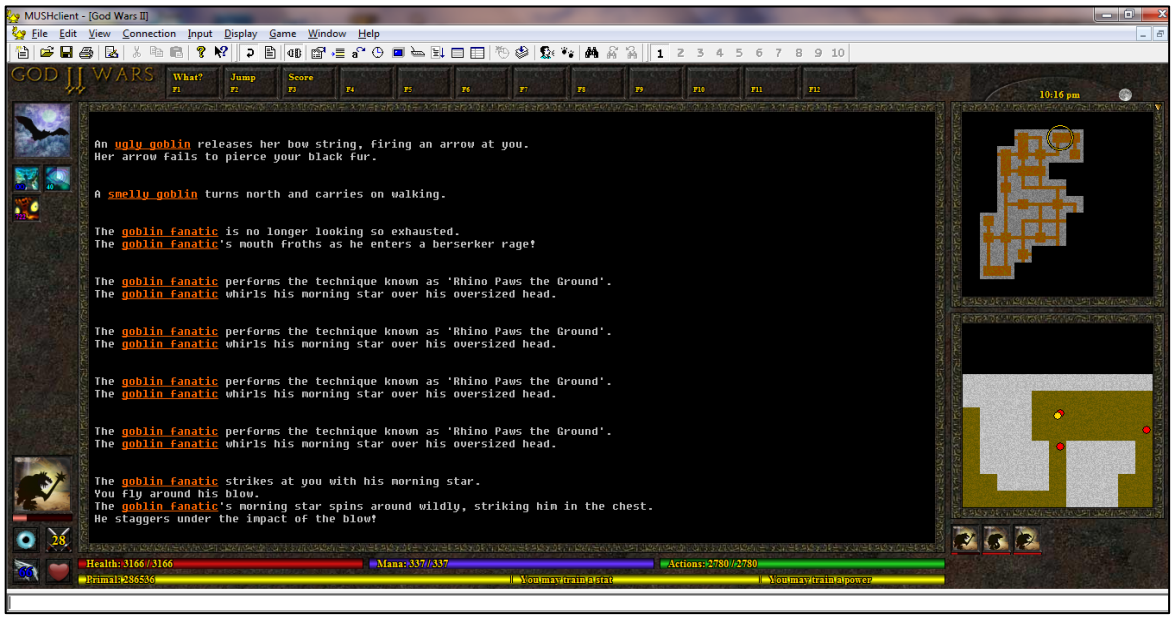


Figure 2: Screenshot of the God Wars II MUD. (Wikipedia user KaVir. Creative Commons licence BY-SA 3.0)

Players design a character by picking characteristics such as race and class. They can further customise their characters with a unique name and a text description. Players interact with the world through the character. They are shown a text description of their character's current location

("room") in a virtual world, along with a listing of objects, in-game characters, and creatures. They are able to interact with the objects, characters, and creatures, and move between locations, using text commands. For example, typing the command "go north" would move the character to the location that is adjacent to the north of the current location, and "look in box" would list what is inside a box in the current location.

Multiple people can connect to the same MUD and be in the same virtual world. Players are shown a list of the names of other people in the same room. When another player performs an action, the action is reported to other players in the room, for example "Alice looks in the box".

The characters can explore the MUD world, kill monsters, gather treasure, complete quests, roleplay, and socialise. All of these things can be done individually or in groups. Group activities are encouraged by the game mechanics as different types of characters have different strengths and weaknesses that are complemented by others. As they do more and more activities, they increase in power and gain more skills. This enables them to access more areas in the MUD virtual world with more challenges and better items. More detailed descriptions of MUDs can be found in (Dourish, 1998; Muramatsu & Ackerman, 1998).

Massively Multiplayer Online Games (MMOGs)

MMOGs (Figure 3) are very similar to MUDs but take advantage of the capabilities of modern Internet connections and graphics hardware to provide 3D[5] immersive environments.

Figure 3: Screenshot from the World of Warcraft MMOG. (Flickr user thms.nl. Creative Commons licence BY 2.0)

As in MUDs, players build characters using race and class options provided in the game. They use this character to interact with the virtual world with many other players. As they play and complete challenges in the game, the character increases in ability and can access more challenges in other areas.

There are many MMOGs – Wikipedia has an extensive list[6]. However, World of Warcraft (WoW) has the largest subscriber base (Van Geel, 2013). It is certainly the most popular amongst researchers, largely because there are facilities for gathering data about how people are playing the game. There are in-game tools, such as the "/who" command, which provides a detailed list of the characters online as well as information such as their level, group status, and location (Ducheneaut, Yee, Nickell, & Moore, 2006a). The other source of information is the Armory, which is a searchable database of character profiles. The scale and richness of information available has made it very attractive for many studies, e.g. (Bardzell, Nichols, Pace, & Bardzell, 2012; Ducheneaut, Yee, et al., 2007; Nardi & Harris, 2006b; Williams et al., 2006; Wong, Tang, Livingston, Gutwin, & Mandryk, 2009).

[5] 3D is used most often. There are some MMOGs, such as Maple Story (maplestory.nexon.com), that use 2D in a style that is reminiscent of older "platform" games.

[6] http://en.wikipedia.org/wiki/List_of_massively_multiplayer_online_role-playing_games

In-game behaviour in MMOGs has been linked to basic offline personality (Yee, Ducheneaut, Nelson, & Likarish, 2011). For example, players who score high in extroversion tend towards group activities, while those who score lower in extroversion tend more toward solo activities. This means that, apart from the value of the community in itself, it also reflects how physical world communities are likely to behave.

Expression of personality also takes other forms. The combination of large numbers of people with rich visual presentation results in self-presentation behaviours and sense of identity being high in MMOGs (S. Park & Chung, 2011). The desire for self-presentation has a strong positive effect on commitment to the larger game community.

Behaviour in MMOGs is not always just about playing the game. The social interactions frequently exhibit a high level of intimacy, as people share personal information and support each other (Pace et al., 2010). People form relationships that can sometimes cross into the physical world.

Multiplayer Role Playing Games (MRPGs)

MRPGs (no picture as they appear identical to MMOGs) are very similar to MMOGs in both setting and presentation. They differ significantly in having a restricted group of people playing at once; instead of commercially hosted servers with millions of people connecting, servers are privately hosted and have smaller numbers (sometimes as few as 2-4, or as many as 100). Well known games in this genre include Diablo and Neverwinter Nights (Ghuman & Griffiths, 2012; Griffiths, Davies, & Chappell, 2003).

Like MMOGs, the games offer a 3D immersive fantasy world. Players create characters to interact with the world in the same ways as in an MMOG. The differentiator in terms of play experience, is that there are less people interfering with each other in the virtual world, and the story arc can be more consistent for the group.

In their cross-genre comparison study, Griffiths et al. (2003) found that MRPG players make good friends in the game and often support each other by discussing sensitive issues.

Multiplayer First Person Shooter (MFPSs)

FPS (Figure 4) games again put the player in control of an avatar that moves around a 3D virtual world. The player views the world in first person view, through the eyes of the avatar. From this viewpoint, the player sees only the avatar's arms and weapon. The weapon is most often some kind of firearm. The goals are military in nature, including activities such as killing others, capturing territory, protecting targets from others, and retrieving objects. Small teams coordinate to compete against either computer AI opponents or teams of other players. Well known games in this genre are Halo (Mason & Clauset, 2013), Call of Duty, and Quake (Ghuman & Griffiths, 2012).

Figure 4: Screenshot from the FPS Call of Duty. (Flickr user Crypticommonicon. Creative Commons licence BY 2.0)

Teams coordinate complex actions at high speeds and under pressure. Coordination is achieved through specialised verbal communication (Tang, Massey, Wong, Reilly, & Edwards, 2012). Communication in FPS games, despite being conducted in time-pressured environments, is rich and creative (Wright et al., 2002). In their cross-genre comparison study, (Griffiths et al., 2003) found that MFPS players do not make friends in the game as often as MRPG and Real Time Strategy game players.

Real Time Strategy (RTSs)

RTS (Figure 5) games are wargames where the player controls an army and tries to gain control of areas of a map and destroy enemies. The player must gather resources in order to produce buildings and units of different capabilities for attacking, exploring, building, and gathering more resources. The player issues high level instructions to the units, such as telling them to engage an enemy, but not controlling the details, such as the unit's combat actions. Players have a bird's eye view of the map, usually with a "fog of war" applied, which obscures the parts of the map that the player's units have not visited. Well known examples in this genre are Starcraft, which has large professional leagues (Cheung & Huang, 2011b), and Warcraft, precursor to the MMOG World of Warcraft. In their cross-genre comparison study, (Griffiths et al., 2003) found that RTS players often make good friends in the game.

Figure 5: Screenshot of the RTS Starcraft II. (Flickr user destione. Creative Commons Licence BY-NC-SA 2.0)

Fighting Games

Fighting games (Figure 6) are simulations of competition martial arts matches. The players control characters to strike the opponent. Characters have a "health" score. Each time they are struck by an opponent, they lose some health and when it reaches zero, they lose the match. Matches are also timed and if the time runs out before one of the characters runs out of health, then the character with the most health left is the winner. Well-known examples of this genre include Street Fighter, Mortal Kombat, and Tekken.

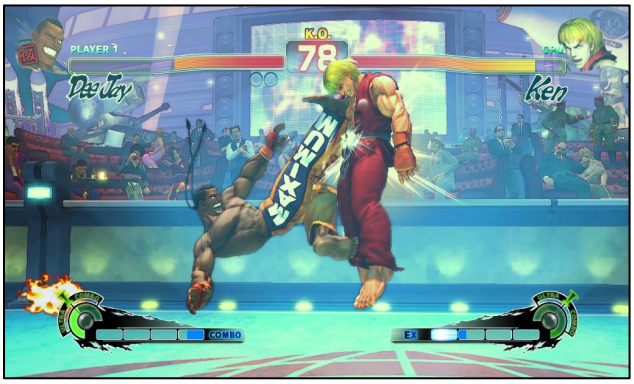


Figure 6: Screenshot of the Street Fighter IV fighting game. (Flickr user Colony of Gamers. Creative Commons licence BY-NC 2.0)

Players can select from a range of fixed characters, who have different fighting styles, such as boxing, wrestling, or kickboxing. In many of the games characters also have magical special abilities, such as throwing fireballs, which also vary by character. Multiplayer modes of fighting games support player vs player and competition between multi-player teams.

Fighting games are one of the common e-sport genres, featuring tournaments that draw large spectator crowds and corporate sponsorship (Su, 2010; Su & Shih, 2011). Tournaments have co-present and remote audiences.

Online Board and Card Games (BCGs)

BCG sites (Figure 7) are online reproductions of physical board and card games such as Chess, Bridge, and Scrabble. The games are played as they are in the physical versions, though the rules are enforced by the game system, which restricts local variations or "house rules" that are common when people play casually. The game servers are most often accessible through the Web, but many have dedicated client software as well. Popular sites in this genre are the Internet Chess Club (chessclub.com), the Internet Go Server (pandanet-igs.com), PlayOK.com, and Yahoo! Games (games.yahoo.com).

Figure 7: Screenshot of the igGameCenter BCG site showing the main page and a game table.

Interfaces for playing these games are very similar. They have a "room" which shows a list of people online and games in progress. This main room will usually have a text chat. From the main room, players can enter an existing game or start a new game. At the game "table" there is a view of the current game state, e.g. the chess board and pieces, a list of the people at the table, including players and spectators, and a game specific text chat. There are often different chat channels at a game table so that spectators can choose whether their comments can be seen by the players (known as "kibitzing") are only visible to the other spectators.

There is little research into social structures in these game sites. The small amount that exists suggests that the social interaction is based around casual encounters rather than lasting relationships (McEwan et al., 2012), and that at least some of them are highly dependent on strong volunteer management (Ginsburg & Weisband, 2002a). However, these results do not seem like they are unique to board and card game sites and could extend to other game settings as well.

Online Multiplayer Game Groups of People

A fundamental requirement of community is having a group of people. The groups that play different types of game differ in their demographics and motivations.

The demographics of game players change over time and by game type. Where the primary game mechanic is violence, such as in FPSs, the game population is heavily male-dominated (Ghuman & Griffiths, 2012). However, the age distribution is more spread and older than the common stereotypes would suggest, with averages in the high 20s rather than teens. In games that can have a more social orientation, such as MMOGs, women are playing in greater numbers (Griffiths et al., 2003).

Table 1 shows a summary of various studies that provide some demographic information. Study Time is when the study was conducted, or when the paper was published if that information is not available. Population is the type of players surveyed. #People is the number of study participants. Ages, Gender, and Nationality are the demographics in the form reported in the publication. Where nationality is not reported, the research institution location is indicated. For all game types other than MMOGs, the table lists all studies demographics in that game type. In the case of MMOGs, there are so many studies that the table only shows one study for each time period. Studies reporting often seem contradictory on the surface, but these conflicts can be attributed to differences in the population sampled, recruitment process, and the time of the study. It is important to note that these are not the only studies about the game types, but are the only ones that report on the demographics of all players in the game. MMOGs show an increase in female participation in recent years; a trend that does not seem to be reflected in other genres (though there are limited studies in other genres so it is hard to tell). Despite the increase, female participation is still well below male participation.

Studies that looked at education and income level, e.g. (Griffiths et al., 2003; Williams, Consalvo, Caplan, & Yee, 2009) (again limited to MMOGs), showed a reasonably even spread, though there was some bias towards those still in the educational system.

Table 1: Summary of demographics from studies on different types of games.

Multi-User Dungeon (MUD)						
Study Time	**Reference**	**Population**	**#People**	**Ages**	**Gender**	**Nationality**
Published 2002	(Roberts et al., 2002)	MOO Users (1 site)	58	M=26, SD=8.5	69% Male 23% Female	64% US 8 other countries
Massively Multiplayer Online Game (MMOG)						
Study Time	**Reference**	**Population**	**#People**	**Ages**	**Gender**	**Nationality**
1999 - 2000	(Griffiths et al., 2003)	Everquest (2 sites)	7000 - 15000 (varies per question)	(site 1) 72% 14-29 (site 2) 71% 10-30	(site 1) 84% male (site 2) 86% male	(site 2 only) 73% US, 8% Canada, 4% UK
2000 - 2003	Yee, 2006	Variety of MMOGs	~5500	M=26.57, SD=9.19	85.4% male	Not reported (North American)
Unknown (prob. 2000 – 2005)	Williams, Consalvo, Caplan, & Yee, 2009	Everquest II	7129	Males M=32.82, SD=8.28; Females M=33.49, SD=9.19	80.22% male	Not reported (North American)
Published 2010	(Pace et al., 2010)	World of Warcraft	62	90% 18 -33	76% Male	Not reported (North American)
2010	Debeauvais, Nardi, Schiano, Ducheneaut, & Yee, 2011	World of Warcraft	2865	Only older players 6% over 45	31% Female	72% US, 15% Taiwan, 9% Hong Kong
Published 2012	Yee, Ducheneaut, Shiao, & Nelson, 2012	World of Warcraft	1037	M=27.03, SD=8.21	26% Female	Not reported (North American)
Role Playing Game (RPG)						
Study Time	**Reference**	**Population**	**#People**	**Ages**	**Gender**	**Nationality**
Published 2012	(Ghuman & Griffiths, 2012)	Variety of RPGs	119	M=25.6	80.5% Male 19.5% Female	34% US, 8.2% Canada, 19.8% UK, 29.7% other Europe
First Person Shooter (FPS)						
Study Time	**Reference**	**Population**	**#People**	**Ages**	**Gender**	**Nationality**

Published 2007	(Jansz & Tanis, 2007)	Variety of FPS	751	M=18.09, SD=3.92	99% Male	Not reported (Dutch)
Published 2012 (prob 2010/2011)	(Ghuman & Griffiths, 2012)	Variety of FPS	156	M=21.5	94.9% Male 5.1% Female	34% US; 8.2% Canada; 19.8% UK; 29.7% other Europe
Op to Nov. 2012	(Mason & Clauset, 2013)	Halo FPS	1191	M=20	94.9% Male	~75% US; 14% Canada and UK
Real Time Strategy (RTS)						
Study Time	**Reference**	**Population**	**#People**	**Ages**	**Gender**	**Nationality**
Published 2012	(Ghuman & Griffiths, 2012)	Variety of RTS	78	M=19.6	98.7% Male 1.3% Female	34% US; 8.2% Canada; 19.8% UK; 29.7% other Europe
Board and Card Game (BCG)						
Study Time	**Reference**	**Population**	**#People**	**Ages**	**Gender**	**Nationality**
2010	(Ghuman & Griffiths, 2012)(McEwan et al., 2012)	PlayOK	124	18 to >50	87% Male	Not reported

Players are also motivated differently, and the motivations vary within game genres as different people are there for different reasons. The best known work on player motivations is (Bartle, 1996) study of Multi-User Dungeon (MUD) players. Through "long, heated discussion … between … highly experienced players" he arrived at four types of players: Achievers, Explorers, Socialisers, and Killers: Achievers are motivated by gaining points or kills or levels in the game; Explorers are motivated by finding out about the game and how it works; Socialisers are motivated by the social aspects of the game and interacting with other players; and Killers are motivated by interfering with the gameplay of other players. These four states are evocative, easy to identify with, and simple to remember.

More recent work on player motivations urges researchers to move on from Bartle's types, e.g. (Dixon, 2011; Yee, 2006). Bartle himself has talked of the limitations of his original work, but points out that the contribution was the idea that gamers are not a homogenous group (Pearce, 2013). The main limitations to applying Bartle's four types are first that the work was specifically about MUD players, and second that there was no empirical analysis. The problem with not having empirical analysis is not so much about reliability, but more about separability and independence of

the types. For example, to explore most games, a player will have to achieve levels and points to get to more difficult areas; so is there really a separate Explorer type or are they a special type of Achiever?

(Yee, 2006) investigated this issue, using questionnaire responses from players of the World of Warcraft MMOG. He found ten different player motivations in three components: (1) achievement, including advancement, mechanics, and competition; (2) social, including socialising, relationship, and teamwork; and (3) immersion (in the game) including discovery, role-playing, customisation, and escapism. The different components did not suppress each other, meaning that having one component present did not imply any limitations on other components.

Gender has been found to make a difference in player motivations. (Yee, 2006) found that males dominated the achievement motivation component, though the variation was better explained by age. He also found that there were more females in the relationship subcomponent – though not the socialisation component overall. In a different study (Cole & Griffiths, 2007) found that females in MMOGs were more likely than males to be motivated by "therapeutic refreshment". Males were more likely to be motivated by "curiousity, astonishment, and interest".

In a rare comparison of motivations across multiple genres, (Ghuman & Griffiths, 2012) found that RPG players were mostly motivated by immersion and socialising, FPS players were motivated by achieving and socialising, and RTS players were motivated primarily by achieving and immersion.

Studying Virtual Communities in Games

Online multiplayer games provide data on social behaviour that is otherwise unusual in social science (Williams et al., 2009). When researchers have access to the log data from games they are able to determine with great accuracy not just explicit interactions between players but also actions around objects in the game. In addition, the data is gathered unobtrusively, avoiding bias from visible observation.

Observing

Direct observation has been a relatively popular technique for gaining insight into gaining insight into the social structures and interaction in online games. For example, (Manninen, 2001) observed Counter-Strike teams at a Local Area Network (LAN) tournament.

However, as it is difficult to physically observe a distributed online game from outside, most of the studies have been in the form of participant-observation, where the researchers participate in the game. As players of the game, they record their own interactions and the interactions they observe around them. This results in a "thick description" of the game which can be used to generate a description of the game culture "in terms of cognitive practices, their basis, and their consequences" (Steinkuehler, 2006).

Participant-observation is the primary technique of most studies of MUDs – e.g. (Muramatsu & Ackerman, 1998) – and MMOGs – e.g. (Ducheneaut & Moore, 2004; Nardi & Harris, 2006b; Steinkuehler & Williams, 2006). However, the technique has also been used to reflect on spectator culture (Su & Shih, 2011) and Fighting Games (Su, 2010).

The strength of this broad category of technique is that researchers gain an understanding of depth and context. The weakness is that, while the understanding gained is deep, it is not very broad – typical online game community populations are large and an observer can only see a small part of the activity.

Questioning

Studies of social interaction in games use the same style of questioning techniques as the social science studies of virtual communities. There are structured questionnaires with fixed answers, free form online surveys, and interviews.

Questionnaires with fixed answers, such as Likert scale responses, are most suitable for large numbers of responses that are intended for automated processing. One such example is (Yee, 2006) study of player motivation, which surveyed over 3000 World of Warcraft players to construct a model of player motivations.

Free-form responses are harder to analyse but allow more room for surprising answers and for more exploratory studies. For example, (Pace et al., 2010) took a phenomenological approach in their study of intimacy in MMOGs. Their survey asked questions about intimacy experiences, but without defining intimacy and so let the responders make their own definitions.

Interviews require more effort and by necessity involve less people. However, they offer great scope for getting in-depth answers, especially when the interviewer asks follow-up questions (Nardi & Harris, 2006b; Siitonen, 2009a)

Data Mining

(Ducheneaut et al., 2006a) used a "social accounting" approach (Brush, Wang, Turner, & Smith, 2005b), which analyse basic metrics of player behaviour traces, to investigate patterns of grouping behaviour in the World of Warcraft MMOG. For example, they used data about player online status, levels, and grouping to map out how quickly players progressed through levels, how much they played according to progress, and at when they were more likely to group with other players. (Huang, Ye, Bennett, & Contractor, 2013) used similar metrics to analyse grouping behaviour relative to quest completion in the Dragon Nest MMOG.

Social Network Analysis is of most use when there is an explicit relationship structure between players. For example: (Szell & Thurner, 2010) made use of the Pardus MMOG's explicit friend and enemy lists as well as communication relationships to study social structure, and were able to tie the results to (Granovetter, 1973) weak ties hypothesis; and (Kirman & Lawson, 2009) made use of the explicit links to tasks in the online game Familiars to analyse patterns of play in hardcore and casual players.

Virtual Communities in Online Multiplayer Games

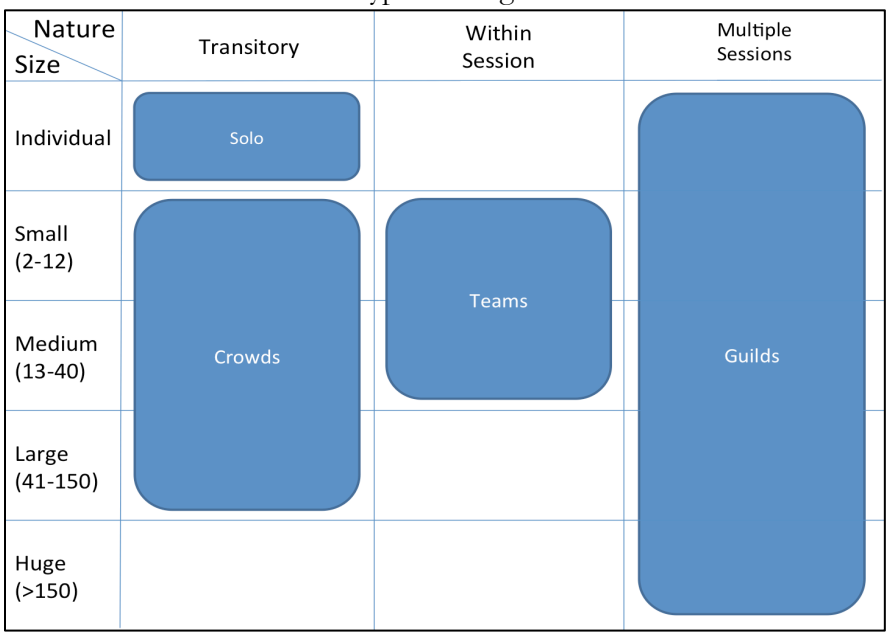
This section explores literature about social structures in Online Multiplayer Games. I organise the literature into types of social structures around the games – such as Game Lounges and Clans – and within the games – such as Teams and Guilds. This division is based on a similar division made by (Jaakko Stenros, Paavilainen, & Mäyrä, 2009a). Around the game, players interact in ways that support the games but are not playing the game. Sometimes these are extensions to the game environment, such as in BCGs where there is an area for people to find opponents for the games. Other times they are entirely outside the original game environment, such as a wiki containing hints and maps for playing an MMOG. I discuss both types in this section.

For each of the social structures I describe what it is and how the interaction works. I then discuss the social role of the structure in a table that links the social structure to the terms used in the Sense of Virtual Community framework in subsection 0. It is important to note that while the original research of the social structures is established, linking these findings to virtual community theory is my own interpretation. There is no work that directly relates social theories of community to the social structures of online multiplayer games.

I have chosen to the approach of reporting on past research on social structures of online multiplayer games because this structure serves to give an overview of the work that has been done

before. I relate these structures to SOVC, rather than the naïve definition that I will actually use throughout the thesis, because the relationship to SOVC gives a clearer picture of why these structures, and hence the past research, is important to the games creating communities.

Table 2: Different types of in-game social structures



Interactions Within Games

Virtual communities within games take on a variety of forms. The forms vary by the number of people and the length of time that they last. These variations and the different types of social structures are shown in Table 2.

I use two dimensions to categorise these social structure types – size and nature. Size refers to the number of people in the social structure. Nature refers to a more qualitative property of the interactions without imposing a strict time limit. For example, *passing* interactions are transitory without much depth to them, while *within session* interactions are deeper and more meaningful, though the passing interactions may take more time. It is worth noting that I have created Table 2 simply as a means of organising reviewed material; it does not come from an external source.

A consequence of my organisation is that the only long-term, in-game social structures are in games with persistent worlds, such as MMOGs, MUDs, and MRPGs. My inclusive definition of "around the game" means that long term associations in other types of games all fall outside the game itself.

Solo Players

It perhaps seems strange to discuss solo players in the context of community. However, I am referring to people playing against automated opponents while there are other players around them, but not directly coordinating or competing with them. Solo play can occur in any of the game types, when players play against artificial intelligence opponents while others watch. The equivalent in BCGs is playing against "bots" (short for robots), which are artificial intelligence players.

Solo play is not mentioned often in MMOG research as most focuses on the social interactions, e.g. (Ducheneaut, Yee, et al., 2007; Nardi & Harris, 2006b; Pace et al., 2010). An typical example is (Nardi & Harris, 2006b) who report on the social interaction that they observed in World of Warcraft. They do mention solo play but only in passing. However, Ducheneaut, Yee, Nickell, et al.'s (2006) "Alone Together" study used social accounting measures to gain insight into activity across a broad range of the population. They found that the vast majority of play in this MMOG was solo play, especially during periods when players are focused on progressing their character in the game.

Solo play does not mean that other players are completely ignored however. Even when players are playing alone, in a multiplayer environment there is always a social context (Jaakko Stenros et al., 2009a). Solo play creates a sense of being in a public space (Ducheneaut et al., 2006a). There is an element of "showing off" as players display rank by whatever mechanisms are available in the game. The desire for social context may help to explain why soloing is infrequent in the Halo FPS as there is no avenue for being visible to others while soloing (Mason & Clauset, 2013).

Table 3: Virtual Community properties of Solo Players.

SOVC Category	Comment
Shared Emotional Connection	Despite not engaging in explicit interaction while in solo play, players can still have strong identity-based attachments to the community.
Identity and Identification	Solo players are building their identity by still indulging their desires for self-presentation as well as being aware of and identifying those around them. Other players around them act as an audience. (Ducheneaut et al., 2006a) observed MMOG players leaving their characters standing for long periods of time in public places for others to admire, even though the player was not present at the computer.

Crowds

A crowd is a gathering of players in the same virtual place within the game. These players are not bound together in a stronger community. These settings are where ad hoc interactions often take place. Ad hoc interactions are informal, transitory, and not socially binding. They can be competitive or cooperative. Examples of competitive ad hoc interactions include many BCG games, where players will play against each other but without any resulting social bond, and maybe not even much explicit conversation. Similar informal competitive situations arise in most other types of games, for example in FPSs as players kill each other, MMOG duels, Fighting Games, and RTS matches.

Ad hoc interactions can also be cooperative, such as when answering questions in chat sessions or exchanging services. These type of interactions were observed by (Ducheneaut, Moore, et al., 2007) in the Star Wars Galaxies (SWG) MMOG. SWG is designed so that characters of different types have to interact; for example, all classes have to visit medics to heal and entertainers to rest. Healing and resting activities have to be performed in particular locations in the game world. Hence there are large crowds that gather in these locations in between going on quests. The purpose of this kind of design is to encourage crowds to form and engage in ad hoc interactions.

Ad hoc interactions are often *sociable* – that is, they are simply for the purpose of interaction with no other motive (Simmel, 1949). Sociable interactions are informal and light with no other purpose than the interaction itself. They are often between strangers. Along with the commercial entertainment and healing interactions, more sociable interactions were observed by (Ducheneaut, Moore, et al., 2007).

Ad hoc or casual interactions have been shown to be an important part of maintaining physical communities in the context of *third places* (Oldenburg & Brissett, 1982). Third places are locations that support casual gathering and socialising amongst relative strangers, such as cafes and pubs. Third places that support this type of interaction have been identified and studied in games (Ducheneaut, Moore, et al., 2007; Steinkuehler & Williams, 2006). Players will gather in these places to socialise and engage in game actions such as trading game resources, resting, and healing. In games with many virtual locations (such as MMOGs), crowds tend to form in the same places and create a community culture within that location (Steinkuehler & Williams, 2006). The crowd will enforce that culture by sanctioning those who deviate from social norms, which increases the sense of membership to the community.

Table 4: Virtual Community properties of Crowds.

SOVC Category	Comment
Immersion	The main effect of a crowd is to create "social density", increasing players' sense of social immersion. Crowds are the basis for many ad hoc interactions – there are crowds at many third places.
Support	In games, strangers will often provide informational support, building a sense of community (Nardi & Harris, 2006b). Players also sometimes help each other in passing, for example if a character is losing a battle in an MMOG then a passing character may attack the monster despite not receiving any reward for doing so (Nardi & Harris, 2006b).

Teams

Teams are small groups that form for a short period of time. They are defined by working in coordination to attain a short-term goal. Teams consist of temporary bonds formed to complete in-game tasks (Huang et al., 2013; Nardi & Harris, 2006b).

Teams can be seen in many types of games. In board and card games teams are formed to play a single game, for example a pair to play bridge. In FPSs teams play together either against other teams or against artificial intelligence opponents. In MMOGs, RPGs, and MUDs, teams are known as parties or fellowships, and they are often necessary to defeat larger monsters or finish quests that are too difficult for individuals.

Within many MMOGs the primary activity for most high-level characters is raid quests. Raid quests are large adventure areas with many high level monsters and featuring "boss" monsters. The incentive for completing a raid is specialised equipment that is only available in the raid quest. These areas are designed so that they require large teams to complete them. For example, in World of Warcraft (WoW), raid teams often need to have up to 40 people. To complete a raid, the whole team needs to stay alive. Coordination and leadership within a raid are critical (Bardzell et al., 2012).

The level of familiarity within teams varies considerably in all game types. Teams form for short-term purposes but the members may be drawn from longer term structures, such as contact lists or guilds (Nardi & Harris, 2006b). In the case of contact lists, people are frequently maintained on the list for the purpose of forming teams. However, teams can also be formed from whomever happens to be around at the same time and place; these are usually known as pickup groups or PUGs (Nardi & Harris, 2006b; Y. Xu, Cao, Sellen, Herbrich, & Graepel, 2011).

Table 5: Virtual Community properties of Teams.

SOVC Category	Comment
Shared Emotional Connection	Teams often form for a particular short-term goal, which can form the basis of an identity-based attachment or shared emotional connection.
Membership Feelings	Game interfaces work to create a sense of membership in a team by creating differences in the game between members and non-members. For example, there is usually more information available about a player to their fellow team members than to other players. Teams usually share a team-specific communication channel, such as the team chat channel in MUDs (Muramatsu & Ackerman, 1998) or FPSs (Tang et al., 2012). All these elements create a boundary between the team and everyone else – an important element in creating membership feelings.
Identity and Identification	Teams also play an important role in establishing identity in the wider game community. Being part of a team allows a player to build their own reputation with the other people in the team and also get to know those people. Conversation and actions within the team establish and form identity, for example a player may be marked as novice or expert by their use of community specific terminology when talking (Steinkuehler, 2006). The language used by teams becomes particularly specialised as they respond to the pressures of timing and their goal (Tang et al., 2012; Wright et al., 2002). The use of a common symbol system is important to identity and identification (these points also contribute to membership feelings).
Support	Team members support each other. However, as teams are short-lived and very goal oriented, this support tends to be more in-game rather than socio-emotional (Nardi & Harris, 2006b).
Relationships	Many teams are formed by pre-existing friends (Huang et al., 2013), and in some cases the temporary connections in the team can evolve into long-term relationships (Nardi & Harris, 2006b). Relationships have an effect on team performance as teams with pre-existing relationships do better at certain tasks than ad-hoc teams (Mason & Clauset, 2013).

Guilds

Guilds are persistent mechanisms for social groups in MMOGs and MUDs. They are a response to the persistent-world nature of these games and their purpose is to support long-lived social groups with defined membership. The details of guild mechanisms vary between games but the main parameters are the same: they have a membership list and each member has a rank within the guild. Sufficiently senior members can recruit new people and promote other members. Each guild has its own chat channel that all members can use.

Within these basic parameters, guilds vary a great deal. They can vary greatly in size - (Williams et al., 2006) found guilds ranging from a single person (the guild labels on avatars acting like personal vanity plates) to over 150 people. They also found great variation in the social

organisation, with some guilds being run as military-like organisations with strict hierarchies and rules, and others having a much more informal structure.

Guilds also vary in purpose. Guilds can be reflections of physical-world friend communities. These tend to be the smaller, more informal guilds. Many guilds are formed with the purpose of becoming large enough to field teams to go on raids. However, larger guilds are more socially fragmented into smaller groups.

(Nardi & Harris, 2006b) state unequivocally that guilds are communities. They reference (Driskell & Lyon, 2002) definition of community that communities are groups of people with ties between them. Research about guilds can be related to the theories, such as Sense of Virtual Community (SOVC), that address the ties between people to support that statement.

Table 6: Virtual Community properties of Guilds

SOVC Category	Comment
Shared Emotional Connection	Shared emotional connection in guilds is facilitated through their persistent nature providing a shared history (Steinkuehler & Williams, 2006). They also have a strong community culture as all guilds will have mission statements and policies, whether formally written down or just informally understood (Williams et al., 2006). Guild members also frequently show a need to give back to the community as it is common to help out more junior members with equipment and resources (Nardi & Harris, 2006b), and guild leaders often put in a tremendous amount of voluntary time and effort (Williams et al., 2006).
Membership Feelings	Guilds offer several contributions to membership feelings: similar to teams, guilds have their own chat channels and visual means of distinguishing fellow guild members which establishes boundaries (Ducheneaut et al., 2006a; Muramatsu & Ackerman, 1998); deviators from the guild rules are sanctioned through mechanisms such as demotion or banishment (Muramatsu & Ackerman, 1998; Steinkuehler & Williams, 2006); and guild member lists are always available facilitating recognition of other guild members (Ducheneaut et al., 2006a).
Immersion	Immersion in communities has been shown to be highly influenced by offline contact (Koh & Kim, 2003). Offline meetings are likely in RPG guilds (Griffiths et al., 2003) and MMOG guilds, where one study found 42% of players had had an offline meetup (Cole & Griffiths, 2007).
Influence	Guild community members gain influence in the guild as over time they acquire more of a role in directing the guild. Many games that have guilds codify some of the rights and responsibilities in formal ranking systems and higher-ranking members have extra abilities such as being able to add new members to the guild. The guild leader has the most influence and plays a key role in setting the culture of the guild (Williams et al., 2006).
Support	Guild members provide support to each other. They provide in-game support as is common throughout most game types (Steinkuehler & Williams, 2006), but they also provide deeper socio-emotional support (Cole & Griffiths, 2007; Pace et al., 2010; Williams et al., 2006). For

	example, (Steinkuehler & Williams, 2006) relate how a guild provided support to members affected by a hurricane, keeping in contact with them, making sure they were alright, and providing updates to the rest of the guild online. (Cole & Griffiths, 2007) found that 40% of their study participants had exchanged socio-emotional support.
Relationships	Guilds also provide a setting for creating and building relationships. For example, (Cole & Griffiths, 2007) found that 75% of their study participants had made good friends within the game, and (Williams et al., 2006) found that liking other members was the primary motivation for being in a guild (bond-based attachment). Guilds also increase team forming behaviour, which means more contact with others, building relationships (Ducheneaut et al., 2006a). Relationships in guilds can be a way of maintaining existing physical world bonds, for example friendships between people separated by distance, or be responsible for establishing new bonds, where they can be responsible for making bridging ties between different ethnic, socioeconomic, and cultural groups (Williams et al., 2006). Guild relationships are a mix of casual and deep bonds.

Interactions Around Games

In this subsection I discuss social structures that exist around the games. In many games, communities exist outside the gameplay itself. The main purpose of these communities is to facilitate finding playing partners and opponents, or to support a group that exists inside the game.

For the purposes of this discussion, I will make the distinction that every social structure that is not directly playing the game is around the game. This means that both Game Lounges and game spectators are around the game.

Game Lounges

These are real-time interaction environments that allow coordination and setup of games. They are virtual spaces which provide players with information about other people in the space, games that are in progress, possibilities for watching games, and opportunities to start games of their own.

These spaces are primarily used for organising games. Players can find opponents and/or team members. For example, most multiplayer board and card game sites will have one or more areas for people who are online but not currently in a game. Players are able to interact to find opponents, negotiate starting games, find other games to watch, or to socialise.

In the Internet Chess Club the primary purpose of the game lounge is to organise games, however it is also the site for rich social interaction and explicit volunteer roles (Ginsburg & Weisband, 2002a). The volunteers help people with the site, manage disputes, and organise teaching games.

Game Lounges also exist for some fighting games. Players wait in the lounge for their turn to play alongside spectators watching the game. Both players and spectators have open audio channels which are undirected so everyone in the lounge can hear all utterances (Su & Shih, 2011).

MUDs and MMOGs are an interesting case. They contrast with other types of games because they contain so many players and support such a range of activities. To illustrate, when a player enters a FPS game, they are fully engaged in shooting and moving, but in an MMOG the goals are open ended and a player may have short intense bursts of fighting, but then construct materials, travel across the world, or socialise with other players – they seamlessly move between different activities and levels of engagement. In an MMOG some of the already blurry distinctions between "within" and "around" disappear, and Game Lounges and Contact Lists are part of the primary game. I have chosen to base my classification on the majority of games and include Game Lounges and Contact Lists in this around the games section.

Table 7: Virtual Community properties of Game Lounges.

SOVC Category	Comment
Shared Emotional Connection	Game Lounges provide a perception of common environment and shared place encourages a shared emotional connection in the community (Roberts et al., 2002). Each player perceives the Game Lounge in the same way; they see the other players, the individual games, and have some means of communication with other players.
Identity and Identification	As Game Lounges provide a setting for rich verbal interaction, they provide an opportunity for players to express their identity. For example, knowledge and use of the community's common language shows membership and can express a player's degree of expertise (Su & Shih, 2011).
Support	Game Lounges also provide a setting for community support. Most common is informational support; for example, players often informally offer help in playing the game (Nardi & Harris, 2006b). However, many Game Lounges have more explicit support roles. The Internet Chess Club (ICC) Game Lounge has a range of different types of volunteers providing support (Ginsburg & Weisband, 2002a). Each type of volunteer offers different support, such as: supporting newcomers, answering queries, providing expert game training (both 1-on-1 and expert games in the database), resolving disputes, managing tournaments, and extending the site through plugins.

Contact Lists

Contact lists are player controlled lists of other people that the player wants to be able to find quickly and easily. Most multiplayer games support some form of contact list functionality. Contact lists contain both strangers that the player has enjoyed playing with in the past, and special relationships (Y. Xu et al., 2011).

Contact List relationships do not generally extend to supporting groups; (Nardi & Harris, 2006b) found that Contact Lists did not perform as a group mechanism as most players on a List did not know each other; the owner of the list was the only common link.

Table 8: Virtual Community properties of Contact Lists.

SOVC Category	Comment
Membership Feelings	Contact Lists can also assist in membership feelings as they provide a list of names that players see repeatedly. Simply seeing and recognising names of other players assists in feelings of membership (Blanchard & Markus, 2004).
Relationships	The primary community benefit of Contact Lists is in making it easier to maintain 1-to-1 relationships (Nardi & Harris, 2006b). The lists make it easier for players to contact the other players that they know and like. Using this initial contact they would arrange for their characters to meet up in the MMOG world.

Spectators

There are two types of spectator communities. The first community consists of other players of the game. There is an implicit reputation community as players' ranking or achievements are on display. Reputation is a common motivation for activity in games, and achievements in games usually have outcomes that are viewable by other players. In an online chess community it may be a numerical ELO ranking; online scrabble may have a "Top 10" board; MMOGs have complex avatars that show difficult-to-obtain equipment and the character level. Because the outcomes are visible to other players, achieving them has a performance aspect and part of the motivation is in showing them off to an audience (Ducheneaut & Moore, 2004).

The second spectator community is more explicit and spectators are deliberately choosing to watch others play. Explicit audiences are a little different. In this case, the spectators are not players that observe and admire other, more advanced players – the spectators have chosen to only watch the performance of people playing the game. Probably the largest spectator activity is around the RTS game Starcraft (Cheung & Huang, 2011b). Most Starcraft spectators are in Korea, where games between top players are shown on television, but there are fans all over the world. Fans of the game

will watch live and recorded games online, where the spectator view will be managed and commentated to heighten the experience and tension of the game. There are many events where fans will gather to form physical-world audiences for games, but there are also many online gatherings to discuss games both during and after (Cheung & Huang, 2011b).

Table 9: Virtual Community properties of Spectators.

SOVC Category	Comment
Shared Emotional Connection	Spectators of a game match gain a shared emotional connection that contributes to their sense of virtual community through sharing the perception of a common space (Roberts et al., 2002). This emotional connection is furthered by the shared experience of listening to commentators (Cheung & Huang, 2011b) or other observers (Ginsburg & Weisband, 2002a), and the shared goal of supporting the players. Spectators also increase the connection with the community by working together to build an enjoyable experience for each other (Cheung & Huang, 2011b).
Membership Feelings	Spectators also reinforce membership feelings by sanctioning those who deviate from community norms. (Cheung & Huang, 2011b) found that spectators will judge the sportsmanship and manners of the players and make disapproval clear.
Influence	In a spectator community, there are different sources of influence. As noted before, the spectator community as a whole exerts some influence to create an enjoyable experience. When there are official commentators, they have a great deal of influence on the spectator experience as they choose what the spectators see and know about the match (Cheung & Huang, 2011b). When there are no commentators, such as in a board game, spectators often discuss and comment on the game, providing a similar result. Those with the most experience will have their comments weighted more highly by the rest. This discussion has lead to most board game sites implementing separate chat channels for the audience of games so they are not distracting the players.
Relationships	Relationships between individuals can be reinforced by spectating activities within a community (Cheung & Huang, 2011b). This happens in a number of ways. Perhaps the most obvious is when people have a similar interest in the game and in watching others play; being spectators is then an expression of a part of the relationship. Sometimes a spectator's enthusiasm can draw in others, so that the other person will become a spectator as well and be part of the community.

Online board and card games often have audiences as well. These are very similar to the Starcraft case, where audiences form to observe games between top players. The systems for these games support audiences by giving explicit chat channels to discuss the games, mostly without the players hearing the comments but also with "kibitz" channels that include the players (Ginsburg & Weisband, 2002a).

Physical World Friends

Groups of friends from the physical world often gather inside a virtual game environment to play together. They choose to play online games together because of distance or time constraints, or because the games offer activities that are not possible in the physical world. For example, many groups gather in game because in the physical world they are geographically separated and unable to meet up in person as often as they would like (Nardi & Harris, 2006b). The shared activity of playing together is more rewarding than a phone call (Brown & Bell, 2006).

These groups exist in many types of online games. Similar to gathering to play cards in person, the friends gather online to play as a form of shared activity. There are documented cases in online board and card games (McEwan et al., 2012), FPSs (Y. Xu et al., 2011), and MMOGs (Kolo & Baur, 2004; Williams et al., 2006; Wong et al., 2009).

Table 10: Virtual Community properties of Physical World Friends.

SOVC Category	Comment
Relationships	Relationships that exist in the physical world are often imported into game environments and so have a strong impact on the game communities. These offline relationships are often strong enough that they override online relationships – the groups of friends are usually tightly connected within the games, often playing exclusively with each other (McEwan et al., 2012), and players that know each other offline will communicate more (Li & Counts, 2007). In MMOGs the groups often make use of the in game social structures such as guilds to help with maintaining the community (Ducheneaut & Moore, 2004); for example, recreating family structures in the game, or using playful naming schemes to make relationships clear to others (one pair called themselves "Toast" and "Jam") (Nardi & Harris, 2006b). However, some players deliberately avoid importing offline relationships into online games, saying that purely online relationships are "refreshingly casual" (Nardi & Harris, 2006b). Relationships also sometimes form in the other direction – online relationships move into the physical world. (McEwan et al., 2012) report on two players who met in an online board game site and were later married.

Groups of physical world friends are surprisingly common, though reports in the research are almost exclusively from MMOGs, for example: (Cole & Griffiths, 2007) report 26% of MMOG players surveyed played with friends and family; (Yee, 2005) found 80% of surveyed players played with someone they knew from the physical world; and (Nardi & Harris, 2006b) report that 20 of their 26 interview participants played with offline friends, though they admit that figure may be high due to their interviewee selection process.

Clans

Clan is a term for communities that form around FPSs (Ghuman & Griffiths, 2012; Jansz & Tanis, 2007). While the FPS teams are small and only last for a single session, the clan can have thousands of members and is persistent. Clans field teams against other Clans in competitions. Internally they deal with training, practice, and leaderboards within the Clan.

FPS games are not persistent and so do not have any support for persistent social structures in the game. The result is that Clans use web sites for socialising and coordination. The web site will have membership lists, leaderboards, clan news, and member forums. The web site will also have the relevant information for connecting to the clan's own game servers. The servers are used for events for internal practice and social play.

Table 11: Virtual Community properties of Clans.

SOVC Category	Comment
Shared Emotional Connection	Clans exhibit shared emotional connection through having distinct community cultures, e.g. amateur clans have different culture and motivations than semi-professional clans (Jansz & Tanis, 2007). Clan membership can be motivated by gathering players of similar experience to form teams, but in many cases is also motivated by the social experience as well (Jansz & Tanis, 2007).
Membership Feelings	Membership feelings are enhanced in clans by recognising other members, especially those prominent in the clan hierarchy or particularlly proficient at the game played (demonstrated by voting on the best snipers on the Counter-Strike SGK Clan site http://www.sgkclan.net/).
Identity and Identification	Within Clans, members build and express their identity and identification through playing and posting on the forum. The identity of a clan member is closely tied to their ability in the game. Clans make use of volunteer positions of responsibility such as Administrators and Managers, e.g. http://www.sgkclan.net/team.html has 10 different roles.
Relationships	Clans can also be formed from physical world relationships (Ghuman & Griffiths, 2012).

I am using the term "Clan" from FPSs, but similar structures are also present in other games. For example, MMOG in-game groups (Guilds) often have an out of game presence that includes web forums and fits the definition of Clan (Ducheneaut, Yee, et al., 2007).

Conclusion

Fields such as sociology, psychology, and anthropology have a rich history of work studying physical communities that has extended into studying virtual communities. The fields offer a bounty of theory, methodology, and empirical evidence. However, the experience of this research has not been applied widely to the study of online multiplayer games. Online multiplayer games are growing in popularity and offer a unique setting to study communities. There are many players and these players are generally committed to the games, as evidenced by the commercial success of so many online multiplayer games. The main differentiation from other types of virtual community is that the members are there to engage in an activity other than verbal communication with others – namely playing the game. All virtual communities, including those in games, offer new opportunities to study the properties and operation of communities. In addition games provide an opportunity to study how communities operate around a shared activity.

There are many types of online multiplayer game – including MMOGs, RPGs, FPSs, RTSs, Fighting Games, and Online Board and Card Games – each of them offering different activities and types of social structures. The different social structures that form in and around games can provide insight into social interaction and communities that goes beyond gaming.

However, despite the range of manifestations of community that can be seen in different types of games, past research into social structures in online multiplayer games has concentrated mainly on MMOGs. BCGs have been particularly neglected and very little is known about how the communities function. This thesis will concentrate on analysing two BCGs in order to gain some perspective on the communities.

The first step in studying BCG communities is analysing the properties of the naïve definition – the group of people, the public virtual place, permanence of place and membership, social interaction, and relationships. This thesis will concentrate on these properties, partly because these properties are most amenable to the type of data that I have access to, but mostly because they are a necessary starting point for characterising a new type of community.

CHAPTER 3
SETTING AND METHODS

To investigate online Board and Card Game (BCG) communities, I used log files from two BCG sites, playok.com (PlayOK) and iggamecenter.com (GameCenter), as well as observations and interviews. In this chapter I give an overview of the two sites and the data collected about them, which provides a basis for the studies discussed in this thesis. I also discuss the motivation for studying these BCGs and the study methods I used.

I started my investigation by contacting many administrators of different BCG sites through email, using the addresses provided on the web sites. I received only one reply, which was from the site administrator of PlayOK, who was very generous in sharing log data from his site for three months. The site does not normally collect log data but the administrator implemented logging functions for this purpose. We collaboratively decided on the format and content of the collected data, making sure to collect the actions of users while preserving their privacy. Using the PlayOK data I performed initial investigations to get a sense of how people interact and form communities in BCGs (Chapter 4).

This first study of PlayOK made many interesting conclusions but also demonstrated the importance of investigating another BCG site for the purposes of comparison. While the results were interesting and valuable, it was impossible to determine whether they were particular to PlayOK or more general. To address this, I contacted 40 other site administrators. I only received one response, from the GameCenter administrator, who shared log data with me for the next 16 months. Initially the log files contained the same content as the PlayOK logs, though in a very different format. As I became more familiar with the site, I requested logging of additional information, such as the richer profile information on GameCenter. I used the GameCenter data to compare with the PlayOK data (Chapter 5) and to study leadership in BCG sites (Chapter 6).

PlayOK and GameCenter

The material presented in Chapters 4 and 5 is based upon analysis of three months of system logs from the online gaming sites PlayOK and GameCenter, and Chapter 6 is based on analysis of 16 months of system logs from GameCenter. The logs contained events such as logins, games and chat messages (Table 13). I also participated on both servers, in a variety of different game types, to get a feel for the player experience.

PlayOK

PlayOK was established in Poland in 2001 and has grown at a steady rate since then, with 5.2 million unique accounts reported on the web page as of June 2010 (accounts are removed after one year of inactivity). It is a web-based game site that offers 38 different turn-based games, including board games such as Chess and Backgammon, card games such as Hearts and Canasta, and other games such as Dominoes and Ludo. Three games are single player, and I removed these from the analysis. All other games are player-vs-player only. Free registration is required to play and the site is ad supported. The games are partitioned by language and region, so not all games are available to every person.

Figure 8: Main page for PlayOK. Shows a list of all game types available in this person's region.

PlayOK initially presents the player with a list of the available game types (Figure 8). After selecting a game type and either logging in or registering, the player is presented with a list of rooms (Figure 9). Selecting a room starts a java applet in a new window (Figure 10) that shows a list of active game tables, a list of other people in the room, and a text chat. A game table is a virtual area for a single game, and each room can contain many game tables. From the room area, players can create new game tables, enter existing tables to play or watch, or chat in the public chat area. They can also view the profiles of other players, to see their game history.

Figure 9: PlayOK rooms. Shows the list of rooms for the Chess game type, showing the room names and how many people are inside. The player enters a room by clicking on the room name link. Room names that are not links are full.

Joining a game table opens a new window (Figure 11) with a view of the game, a list of people at the table, the names of the players (or empty places if the game is not full), and a chat area. If there is space at the game, and the game has not started, users can 'sit down' and become players.

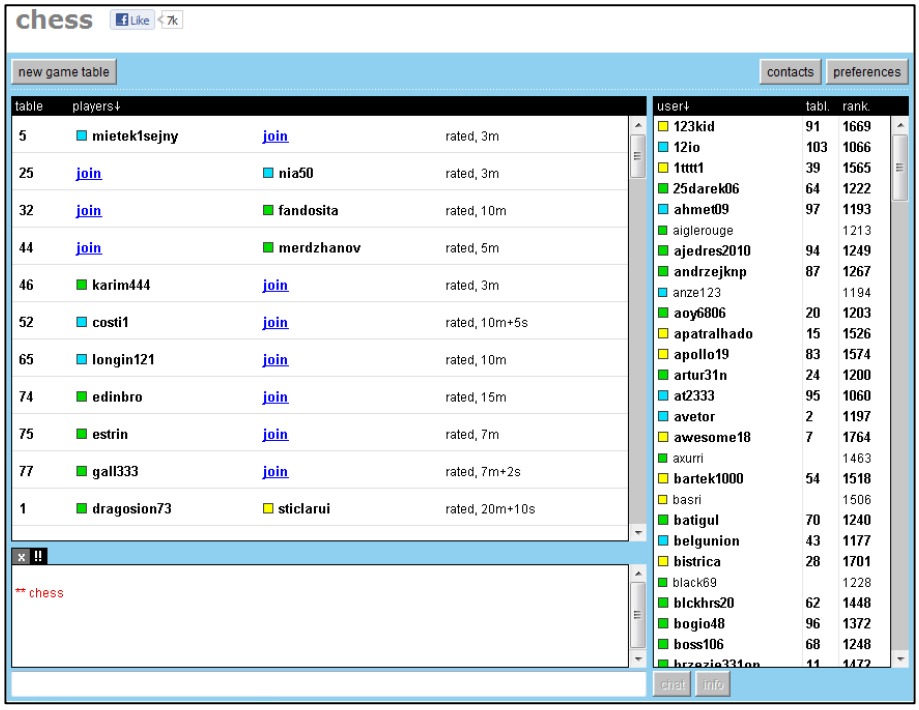


Figure 10: PlayOK room view showing the list of current game tables (top left), text chat (bottom left), and list of players (right).

Figure 11: PlayOK game table for the game of chess. Shows the game board (left), game and player information (top right), and text chat (bottom right). The text chat area can also display other information such as game history or settings. All game types are laid out like this.

GameCenter

GameCenter was established in mid-2007. During the study period I logged approximately 2,000 unique accounts. The site offers 144 different types of games, including well-known international games such as Chess and Checkers, a variety of more culturally specific games such as Xiangqi[7] and Toguz Kumulak[8], and games designed by players, such as Ecalper and Pex. The site is free and run as a hobby by the administrator, who has other employment, though there is a mechanism for donating to the maintenance of the site.

When people first arrive at the GameCenter site, they see the main page that shows the game types available, games in progress, people online, chat history, and latest news (Figure 12). When they try to perform an action, such as send a chat message or start a game, they are prompted to log in (or register if they are new to the site). Once logged in, the main screen allows them to send chat messages, join existing games, view other people's profiles, and start new games.

As with PlayOK, there is a list of games in progress, a list of currently logged in players, and an area for chat. Differently from PlayOK, the right half of the view is taken by a grid of available game types. Selecting one of these game types opens a new game table of that game type. Players can also join existing game tables to watch or, if there is space, join the game.

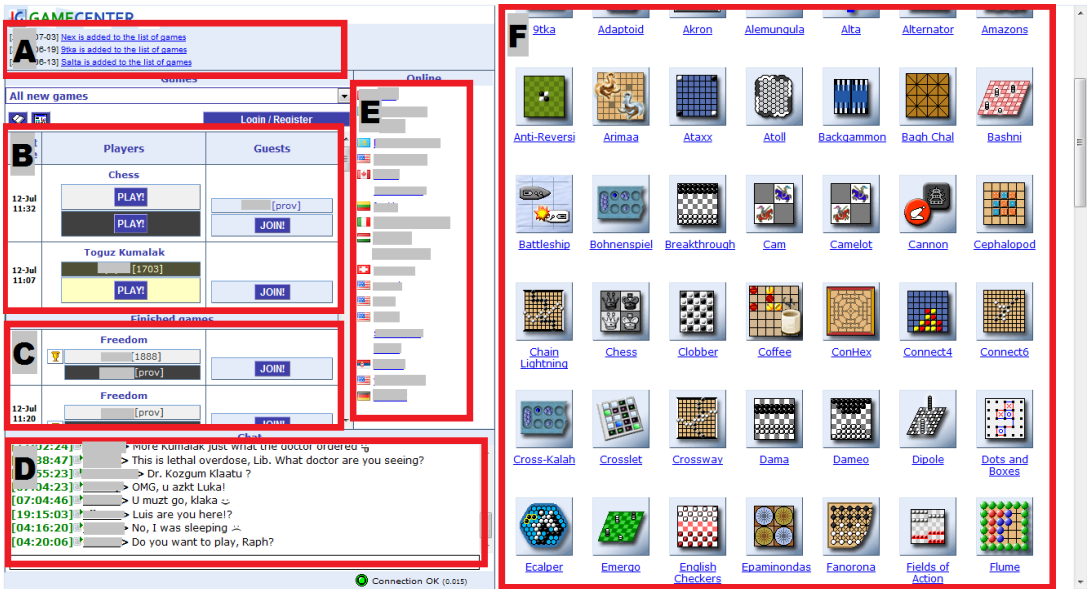


Figure 12: GameCenter main page. (A) latest news; (B) games in progress; (C) past games; (D) public chat; (E) people online; (F) types of games available.

[7] https://en.wikipedia.org/wiki/Xiangqi
[8] https://en.wikipedia.org/wiki/Toguz_korgool

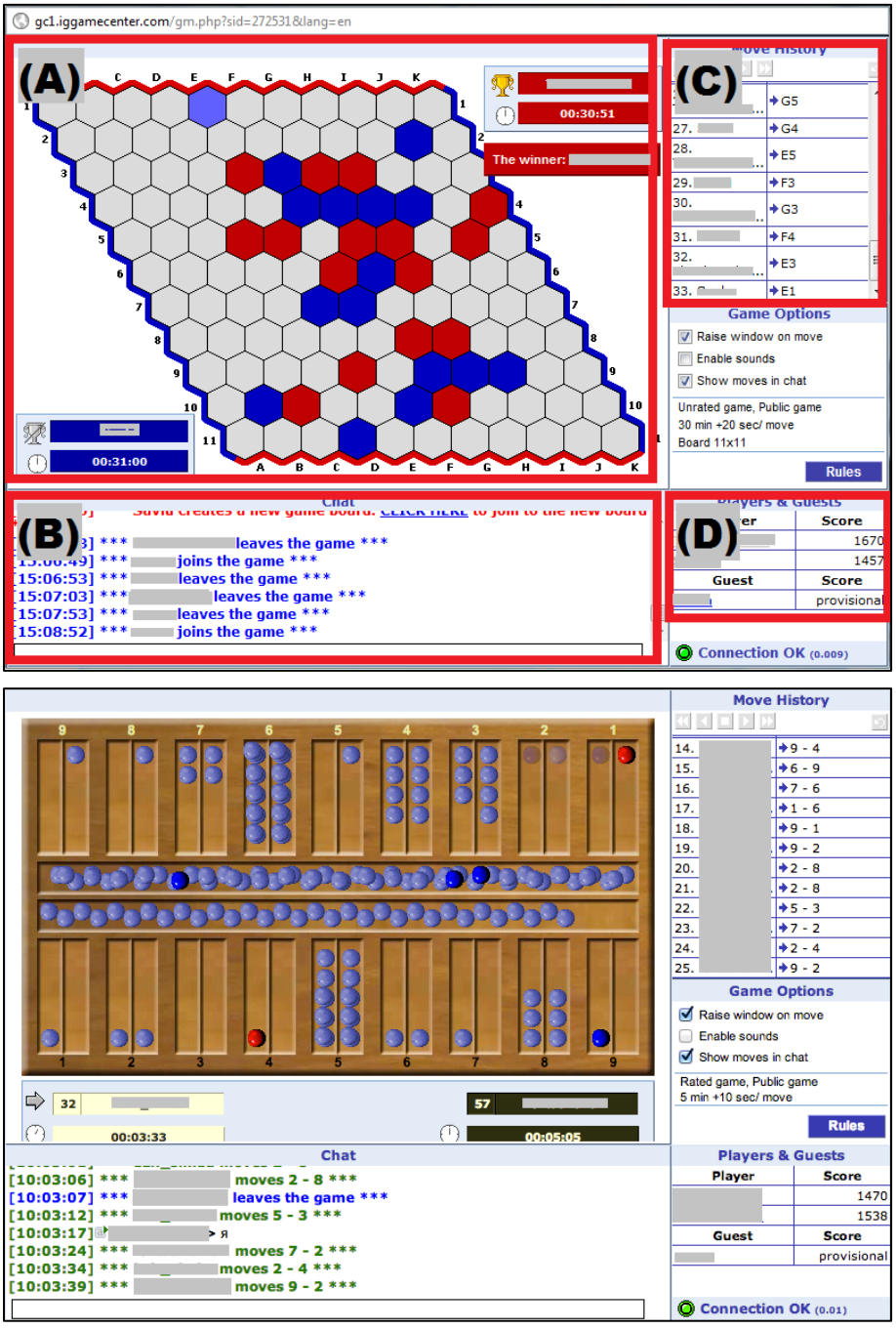


Figure 13: GameCenter game tables for Hex (top) and Toguz Kumalak (bottom). The Hex table is annotated to show sections: (A) game board; (B) text chat and event log; (C) game history; and (D) information about the current occupants of the room. Game rooms for Toguz Kumalak (and all other game types) have the same layout.

After starting a new game or joining an existing game, a new window displays the game table (Figure 13) where Players and Observers can play, watch, and chat. GameCenter game tables are very similar to those in PlayOK. The largest portion of the window is given to the view of the game board. Also shown are the players, other people at the table, the game history, and a text chat area. The most popular game on the site is Toguz Kumalak followed by Hex[9] (both are shown in Figure 13). These two games are most popular by a wide margin.

Comparison of PlayOK and GameCenter

Both sites offer many of the same functionalities: both have a chat functionality to enable direct communication between players, both offer play-by-play history in text format using standard notation, both provide details on opponent profiles, and both offer control over game play settings such as time limits and game board size. However, there are three important differences between the GameCenter and PlayOK user interfaces.

First, GameCenter players log into a common virtual space with all other players, and all game types available to them. Importantly, this is always the same space (i.e. the main page shown in Figure 12), so if two players log in at the same time then they will see each other regardless of which game they intend to play. In contrast, PlayOK players must select their game type first, before logging in. This means that there is segregation of players based on game type. After logging in to a game, PlayOK players enter one of multiple rooms for that game type. A player's room selection is somewhat arbitrary, though our observations suggest that in general players will fill the first room and then start filling the second and so on. The effect is that if two people log in to PlayOK at the same time, unless they choose the same game type and the same room, they will not see each other.

Second, GameCenter is lacking some of the interpersonal interaction features of PlayOK, e.g. invitations within the game site (players can click on an "Invite" button to ask others to join in a game with them), private messaging, and contact lists. This is because GameCenter was originally designed to be a 'gadget' within Facebook or the iGoogle sites, where this additional functionality would be provided.

Third, GameCenter caters to game designers. There is an API for game designers to use and there is a special game type for testing games called the 'Sandbox'. The Sandbox allows free configuration of board type and no rules are enforced. Game designers can communicate proposed rules to play testers and everyone at the game table can discuss and refine the game. In addition, all

[9] https://en.wikipedia.org/wiki/Hex_(board_game)

of the existing games on the site have comprehensive descriptions of the rules, which is an important resource for those learning and people developing Artificial Intelligence players for the games.

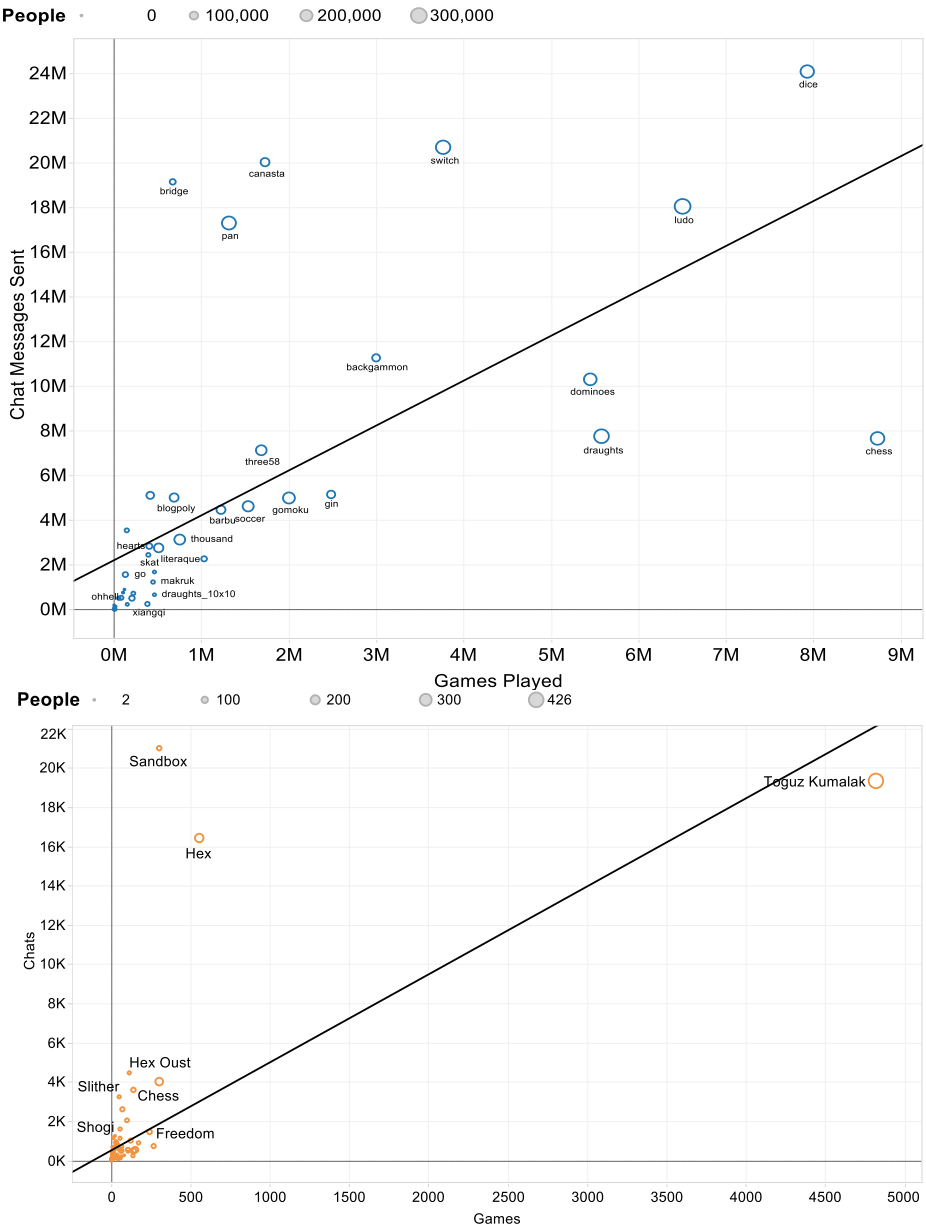


Figure 14: Summary of games played, chat messages sent, and number of players for PlayOK (top) and GameCenter (bottom). Each circle represents a game type; where space permits the game type is labelled. The size of the circle maps to the number of people that played that game type (sizes shown at top of each chart). Position on the x-axis shows number of games of that type played, while the y-axis shows the number of chat messages sent at the game tables. Note that the axes are not the same and PlayOK numbers are ~3 orders of magnitude higher. The lines of best fit are placed as visual aids.

People and Activity

Table 12 shows an overview of the numbers of games, people, and chat messages for different game types in both of the sites. In PlayOK, there were a total of 57,249,663 games played by 3,049,750 people, and they sent 309,627,874 chat messages. Of the chat messages, 74.57% were at a game table, 1.78% were public, and 23.64% were sent privately. In contrast, GameCenter had many fewer players and events, with 9,744 games played by 1,914 people, and they sent 114,054 chat messages. 98.75% of chat messages were at game tables, and 1.25% were public. In both game sites there was a lot of variation in chatting and gaming behaviour between game types, for example, in PlayOK, Chess has many games but relatively few chat messages, while Bridge has many chat messages but relatively few games (Figure 14, top).

Table 12: Counts of people and activity in both GameCenter and PlayOK.

	GameCenter	PlayOK
People (unique)	1,914	3,049,750
Total games played	9,744	57,249,663
Total Chat Messages	126,350	309,627,874
In-game chat messages	124,925	230,892,958
Public chat messages	1,425	5,526,007
Private chat messages	N/A	73,208,909

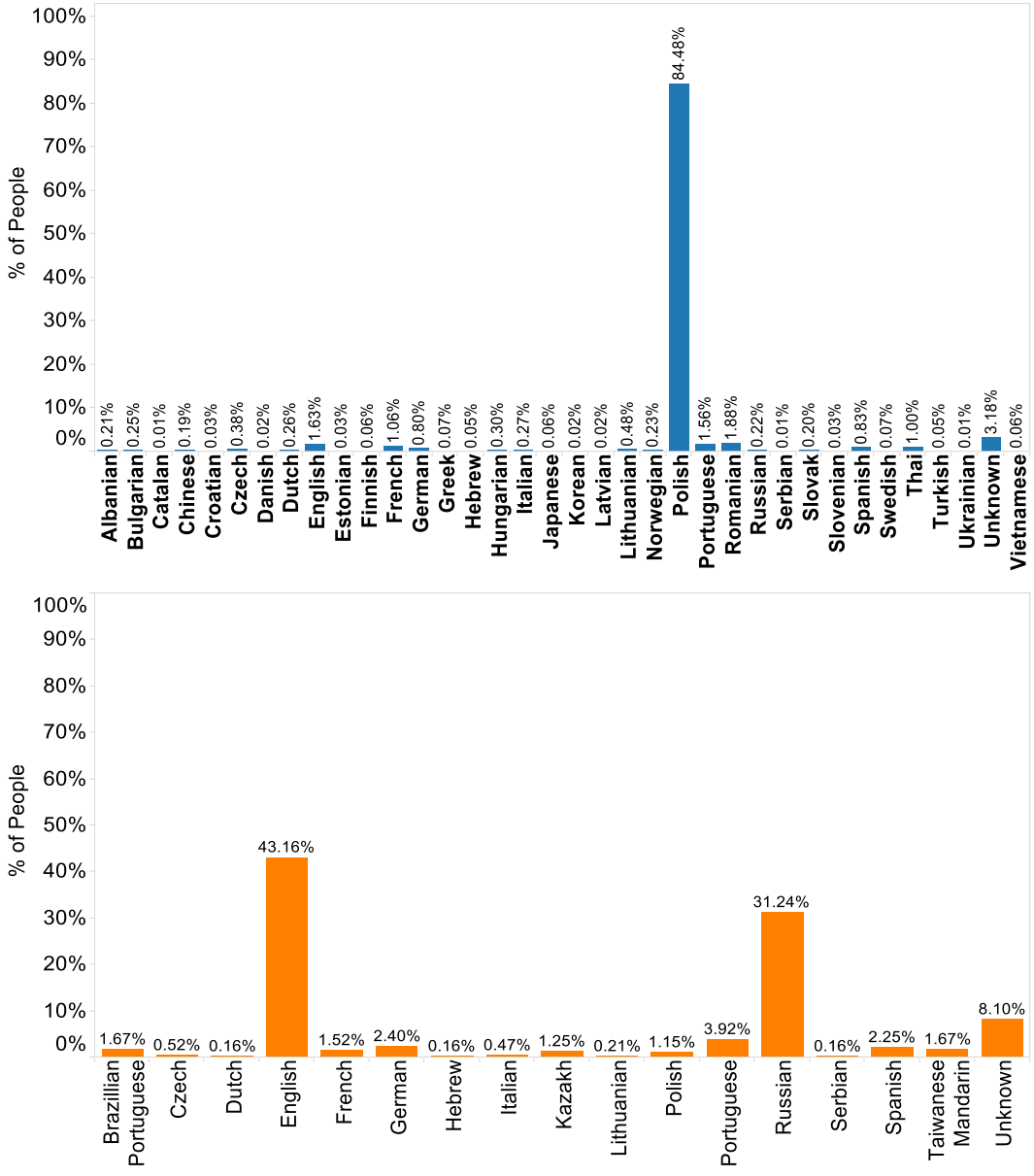
The log files from the two sites record a lot of detail about players' behaviour but is short on information about the people themselves[10]. The one comparable piece of information provided by both sites is the display language. When players register on each site, they can select a language that will be used when displaying the site to them. Both sites have a wide range of languages available, with 35 represented in PlayOK and 16 in GameCenter (Figure 15). In each case there are clear loci, with few players selecting other options: in PlayOK nearly 85% of users prefer Polish, while in GameCenter nearly 45% select English and over 30% select Russian.

In the case of PlayOK, the preference for Polish is likely due to its history. In GameCenter, my experience on the site and conversations with players suggest that the Russian speakers are mostly Toguz Kumalak players. Toguz Kumalak is popular in central Asian countries where Russian is often a *lingua franca*. The GameCenter site founder is fluent in both Russian and English and frequently interacts with both groups. It should be noted that selecting a display language only changes how a player views the site and does not preclude them from communicating in another

[10] There is some profile information in the GameCenter logs but this does not allow comparison with PlayOK.

language in the text chat. There are some limitations on what language can tell us about cultural background as, while some languages are reasonably distinct to particular geographical regions, there are many that are not (English and Spanish are extreme examples). However, this analysis does highlight the potential for communication difficulties.

Figure 15: Distribution of languages by players at registration for PlayOK (top) and GameCenter (bottom).



I also deployed an online survey on both sites, which gave some details about a small sample of the players. In PlayOK, There were 124 responses, 87% male, ages 18 to >50. Respondents represented 22 game types; the largest group were chess players (27%). Most (51%) had been playing on PlayOK for over 3 years. Almost 25% spent more than 12 hours per week on the site. In the GameCenter survey there were 39 respondents (2 female) ranging from 18 to 50+ years of age. They played 73 of the available games, 24 of those were primary games. 22% listed "Hex" as their primary game. Responses were heavily weighted to longer term players – 80% had been on the site for longer than a year and almost 90% (88.89%) for over 6 months. However, they were mostly only light players with 45% visiting for less than 1 hour per week and nearly 90% (88.37%) less than 6 hours per week. In the survey I also asked why people chose GameCenter over other game sites, providing only a free text entry field for the answer. The overwhelming reason was the range of games offered. Many of GameCenter's games (the site developer estimates as high as 25%) are not available anywhere else online. Of those that are available elsewhere, the sites are often not as reliable or have even smaller populations than GameCenter. As the number of respondents in the surveys are very small in comparison to the total populations, I only use survey responses for anecdotes of experience that cannot be found in the log data alone.

Representativeness

PlayOK and GameCenter are representative of BCG sites in their interfaces and interaction mechanics. During my search for data for the studies in this dissertation, I visited and interacted with many BCG sites before connecting with the administrators of PlayOK and GameCenter, such as FlyOrDie (flyordie.com), Pandanet Internet Go Server (pandanet-igs.com), Free Internet Chess Server (www.freechess.org), and Yahoo Games (games.yahoo.com/multiplayer-games).

While there are minor variations, BCG site interfaces are very similar. All the site interfaces share the basic components of rooms (like PlayOK) or a single "lobby" (like GameCenter), depending on their size. In the rooms/lobby there is a way to view the people online, view the games in progress, and to chat to people. All of the sites have the concept of a separate virtual space for the game, which I have labelled a "table" in the above descriptions. At the game table, there is a display of the game board or area, a list of the people at the table, both players and watchers, a means of chatting at the table, and some indication of game mechanics such as turns, scores, and move history. In the interface and interaction sense, both PlayOK and GameCenter are representative of BCG sites in general.

There is one way in which PlayOK and GameCenter are not representative. I approached the administrators of all the BCG sites I could find, but only received data from these two. This may reflect the fact that they are both run by a single person who was also the founder of the site. I would expect that such a simplified organisational structure would mean that the administrators could be more responsive to players, and could shape the site and community to their own goals. For example, Arty Sandler, who runs GameCenter, is interested in game design and encourages other members to design and talk about design. However, the results in the next chapters show that there is still a large component of the interactions on the sites are impersonal and transient.

Methods

In Chapter 2 I outlined a behavioural definition of community that listed five fundamental requirements. I use those five requirements to drive my analysis of the PlayOK and GameCenter communities in this thesis. In this section I specify in detail the techniques used to extract information about these properties from the log files. The five properties are:

1. *The virtual place*, which is either the PlayOK or GameCenter website facilitating interaction with people and playing games;
2. *The group of people* using the site;
3. *Persistence*, the idea that social groups benefit when people are long-term residents of a place (virtual or real) (Blanchard & Markus, 2004), which also refers to the persistence of the place;
4. *Social interaction*, which has been primarily considered in terms of verbal communication, but which I argue extends to shared activity (Driskell & Lyon, 2002);
5. *Relationships*, in which people meet others, associate, and make lasting connections (whether strong or weak) (Driskell & Lyon, 2002; Erickson, 1997).

To characterise the properties, I use *social accounting* metrics. The term social accounting metric was first used formally by (Brush et al., 2005a) who defined it as "metrics about the social dimensions of an online space, such as the number of messages and participants in a newsgroup". In the context of this thesis, social accounting metrics refer to the statistics generated by transforming logging events into information about member behaviour. Another example of social accounting metrics use is Ducheneaut et al.'s (2006a) study of an MMORPG, where they investigated social accounting metrics such as guild membership counts, online/offline patterns, and chats per game.

Social accounting metrics are well suited to the exploratory "big-picture" nature of this thesis. The metrics usually serve to give a general sense of social patterns, rather than detailed views of small differences. As community in BCGs is a new topic, this kind of exploration is a necessary first step to find out the issues that need more detailed study.

I generate social accounting metrics from events in the log files and use them to understand the game site in terms of the five community properties. For example, to characterise relationships between players I measure their interactions such as how many games they played together and how many chat messages they exchanged. Social accounting metrics do not serve for all the requirements however, as they primarily describe players' behaviour. For example, sections describing the public virtual places property only make partial use of social accounting metrics.

In the chapters that follow, I describe a series of studies that primarily help understanding of community in BCGs. In each chapter I describe the social accounting metrics used and how they relate to the five community requirements.

Computational Practicalities

I received the log files from the site administrators in the form of text files. I created scripts using the Python[11] programming language to parse the text into SQLite[12] database files. Additional Python scripts used the SQLite data to calculate the social accounting metrics and write them to Comma Separated Value (csv) format. I then used Tableau™[13] to create charts from the csv files (e.g. Figure 14). The charts allowed me to visualise and explore the data.

[11] https://www.python.org/
[12] https://sqlite.org/
[13] http://www.tableausoftware.com/

```
[Apr 12 08:55:27] prvchat "player1" -> "player2"
[Apr 12 08:55:29] u. "player3" lv. t. #10 (bogart), n=1
[Apr 12 08:55:29] u. "player3" lv. r. "bogart", n=45
[Apr 12 08:55:29] u. "player3" of., tm=166s, n=45
[Apr 12 08:55:30] g. at t. #5 (bogart) starts; pl: player4 (1171), player5 (1226)
[Apr 12 08:55:30] g. at t. #11 (bogart) starts; pl: player1(1274), player6 (1215)
[Apr 12 08:55:33] g. at t. #2 (bogart) ends
[Apr 12 08:55:36] u. "player7" lv. t. #2 (bogart), n=1
[Apr 12 08:55:38] u. "player8" lv. t. #9 (bogart), n=0
[Apr 12 08:55:42] u. "player9" jn. t. #23 (bogart), n=3
[Apr 12 08:55:42] u. "player10" jn. t. #3 (bogart), n=1
[Apr 12 08:55:46] u. "player11" on., l=th, r=2010-04-11, c={contact1}, n=46
```

```
<log stamp="1334891701">
  <games>
    <game sid="game1" priv="0" title="Toguz Kumalak" status="FINISHED" startTime="1334295428"
          modTime="1334296451" uid="player1"  uid1="player1" uid2="player2" />
                          [637 other games]
  </games>
  <events>
    <event eid="10223810" stamp="1334286690" type="MSG" sid="game2" uid="player3"/>
    <event eid="10223811" stamp="1334286703" type="JOIN" sid="game3" uid="player4"/>
    <event eid="10223814" stamp="1334286739" type="LEAVE" sid="game4" uid="player4"/>
                          [~21K other events]
  </events>
  <chat>
    <msg stamp="1334318992" uid="player5"/>
                          [34 other chat messages]
  </chat>
  <userlog>
    <event stamp="1334287301" uid="player4" type="LOGOFF" />
    <event stamp="1334289872" uid="player6" type="LOGIN" />
    <event stamp="1334289948" uid="player7" type="ENTER" />
                          [1506 other user events]
  </userlog>
  <translation>
    <trans stamp="1334300449" numHit="1" lang="ru" />
                          [244 other translations]
  </translation>
  <users>
    <user uid="player8" regTime="1332485137" lang="ru" country="KZ" countryIP="KZ"
          sex="F" birthYear="1998" />
                          [321 other users]
  </users>
</log>
```

Figure 16: Samples of the log files. The PlayOK log file (left) is in text format with each event on a single line, with many abbraviations: "bogart" is the name of a game room, "u."=users, "lv. t."=leave table, "lv. r"=leave room, "g. at t. #11 (bogert)"=game at table 11 in the bogart room, "player4 (1171)"=player4 has a rank of 1174. GameCenter log files are in XML format and more verbose (making them easier to read).

Data from PlayOK came in compressed text files, with each line corresponding to an event on the site. The log files cover 8 April 2010 to 8 July 2010 (91 days). The original compressed logs were 12GB; expanding to 63GB when uncompressed. Each line in the PlayOK log files contained records of events in chronological order, with one event per line. For example, Figure 16 shows 12 events happening in the space of less than 20 seconds on the game of Go (far from being among the most popular games – Figure 14). First a private chat message is sent from player1 to player2; then player3 leaves table #10 and the "bogart" room, before logging off ("tm" is the time spent online, and "n" is the number of players left in the room). Two games are started – one at table #5 and one at table #11 – and one ends at table #2. Some more people join and leave tables, and then player11 comes online. Player's profile information is provided when they log in, for example, player11's preferred language is Thai, she registered on 11 April 2010, and she has one contact in her contact list.

Table 13: Log event information for PlayOK and GameCenter.

Event	PlayOK	GameCenter
User Record	-	User ID, Registration Time, Language, Country, Country by IP, Sex, Birth Year
Login	User ID, Language, Contacts (list of user IDs), Registration date, # people on the game type	User ID
Logout	User ID, Time logged in, # people in the game type	User ID
Room Chat	User ID, Room ID	User ID
Active from idle	-	User ID
Game Chat	User ID, Room ID, Game ID	Game ID, User ID
Private Chat	User ID, Receiver ID	-
Join Room	User ID, Room ID, # people in the room	-
Leave Room	User ID, Room ID, # people in the room	-
Join Table	User ID, Room ID, Table ID, # people at table	User ID, Game ID
Leave Table	User ID, Room ID, Table ID, # people at table	User ID, Game ID
Invite	Inviter User ID, Invitee User ID, Table number	-
Game Start	Room ID, Table ID, User IDs (w/ rankings)	-
Player clicks Start	-	User ID, Game ID
Player changes Game Options	-	User ID, Game ID
Game End	Room name, Table number	Game ID, Privacy Status, Game Name, Player IDs, Start Time

Data from GameCenter came as structured XML (Figure 16). For the study of leadership in Chapter 6 I used GameCenter logs from January 2012 to May 2013, however, for the purposes of comparison between the sites in Chapter 5 I selected a time period of similar length and covering a similar part of the year as the PlayOK logs, using only 8 April 2012 to 16 July 2012 (data in this chapter is also from the shorter time period). The extra few days at the end are to compensate for some missing days in the collected logs. Each file was a record of the past week and was split into sections that recorded games (<games>), the events that happened at game tables (<events>), chat messages in the public area (<chat>), user logins and logoffs (<userlog>), translations (<translation>; users can click a button on any chat message to translate it to their own language), and player profiles (<users>). In this example, player8 says she is female, has chosen her display language to be Russian, says she is from Kazakhstan (confirmed by her IP address), and says she was born in 1998.

The text log files were in different formats from each site but contained much the same information, such as log in and log out, game playing, sending chats, and moving through the site spaces (Table 13). It is important to note that, while log files record that chat messages were sent, there is no message content. This is true for both sites.

I first parsed the raw log text and put the information into a structured database format. I created database tables that gathered information about the player, game, and chat entities, and I created links between these tables to allow querying about such things as how many chat messages a player had sent, or how many games they had played. I also did more complex processing of the logs to elicit time-dependent relationships, such as tracking which players were at a game table to determine who would receive a chat message sent to that table at a specific time.

The second step was to execute queries on the database, process the results, and write them out to a format that could be used for visualisation. I wrote Python programs (combination of scripts and Object Oriented Programs) to perform the processing. As I was using Tableau™ for the visualisations, the best choice for the intermediate format was CSV. For example, one of the metrics I was interested in charting was the number of players versus the number of games they had played (Chapters 4 and 5: How Much Do People Play Together). In this case the end CSV file was a single line for each game site with the column numbers being the number of games, and the values being the number of players who played that many games. This intermediate step was necessary because of the size of the data. The charting software, Tableau™, is able to interact directly with database servers but the PlayOK data proved too large for it and the program was too slow to use in that mode. As it was, my programs often took many hours to run, in some cases multiple days. The process was extremely sensitive to the composition of SQL queries, as any inefficiency could result in added delays of hours or even days.

The third and final step was to import the data into a visualisation tool (I used the charting software Tableau™). This enabled me to visualise and explore a high level view of behaviour. I used the most insightful of these charts in this thesis to communicate the ideas.

Conclusion

PlayOK and GameCenter are very similar BCG sites. They both offer the same kind of service, with mostly similar interfaces. However, they differ enough to provide more coverage of BCGs than a single site would. I have explored these sites using the log files to generate social accounting metrics. I do an initial characterisation of one BCG through a study of PlayOK in Chapter 4, I compare PlayOK with the same metrics from GameCenter in Chapter 5, and I analyse the role of leadership in BCGs based on events in GameCenter in Chapter 6.

CHAPTER 4
CHARACTERISING AN ONLINE BOARD AND CARD GAME COMMUNITY

To find out more about social behaviour among users of online game sites, I carried out an analysis of the game site PlayOK, as described in the previous chapter. My primary analysis focused on the activity log files (containing more than 400 million events), and employed the social accounting techniques that are described in Chapter 3. I also frequented the site, observed gameplay on a regular basis, and gathered responses from an on-line survey of 124 PlayOK players; these observations and survey data were used to help interpret and fill out the log analyses.

My analyses of PlayOK were structured around characterising the five behavioural community requirements described in chapters 2 and 3 – a virtual place, a group of people, social interaction, relationships, and persistence. The analyses show that PlayOK is quite different in terms of social behaviour depending on the questions being asked. When considering questions relating to playing games, there is a great deal of social interaction – for example, in the log files I found more than three million active members and, on average, almost 630,000 games played per day; many people (more than 5,000) play many games per day (more than 20), and relationships are being formed as people play much more frequently with a small group of opponents (on average, people play more than half of their games with only three other people).

In other analyses, PlayOK seems like a much less social place. Overall, people talk very little during games (70% of games have no chat messages, and over 90% have three or fewer), and there is even less conversation outside of the games. Many interactions on PlayOK appear to be highly impersonal, with many one-time-only games; in addition, the interface automates much of the articulation work of the games, allowing people to play with no conversation. Last, the player population of PlayOK is highly transient – most people stay for only a few days, and only a small proportion of users stay active for more than a few months.

Although there are some exceptions to these findings (one person even met her future husband on PlayOK), the overall picture is one of a population whose only real contact with one another is through the games themselves. This poses a question that has not been widely considered previously in CSCW – how can an online gathering place survive for so long, and be so popular, with so few of the characteristics that are seen as vital to the health of a community?

Although the investigation is preliminary, it seems clear that the kinds of interactions seen in PlayOK have as many benefits as potential drawbacks. This chapter shows the importance of considering a wider view of social interaction when designing for community in online game sites.

The impersonal and action-based nature of the interactions provides low barriers of entry and the flexibility for many different interaction styles.

The Virtual Place: PlayOK

The results and discussion that I present in this chapter are based on the PlayOK site as described in the previous chapter. PlayOK is a large and active BCG site and the results here are from three months of logging of events such as login/logout, games, and chat messages. PlayOK is a large and successful site, with many people playing many games.

The Group of People

As discussed in Chapter 3, the people of PlayOK come from a wide range of linguistic backgrounds, though they are predominantly Polish. This wide range, which includes different alphabets (e.g. Hebrew, Russian, English), suggests that there will be difficulty communicating through chat in many games.

Persistence

I explored member persistence by looking at the degree to which people form a long-term association with the site – in real-world groups there is persistence of membership as people commit time to the group. In particular, I considered two specific questions: whether people remain in the PlayOK population for a long time; and whether people participate regularly.

How long do people stay active on PlayOK?

I used people's participation times as an indicator of their degree of association. The logs provided each person's registration date and when they were last active, allowing me to examine 'PlayOK ages' based on how long they had been active on the site. In Figure 17 I show the percentages of the population with different age ranges on a log scale.

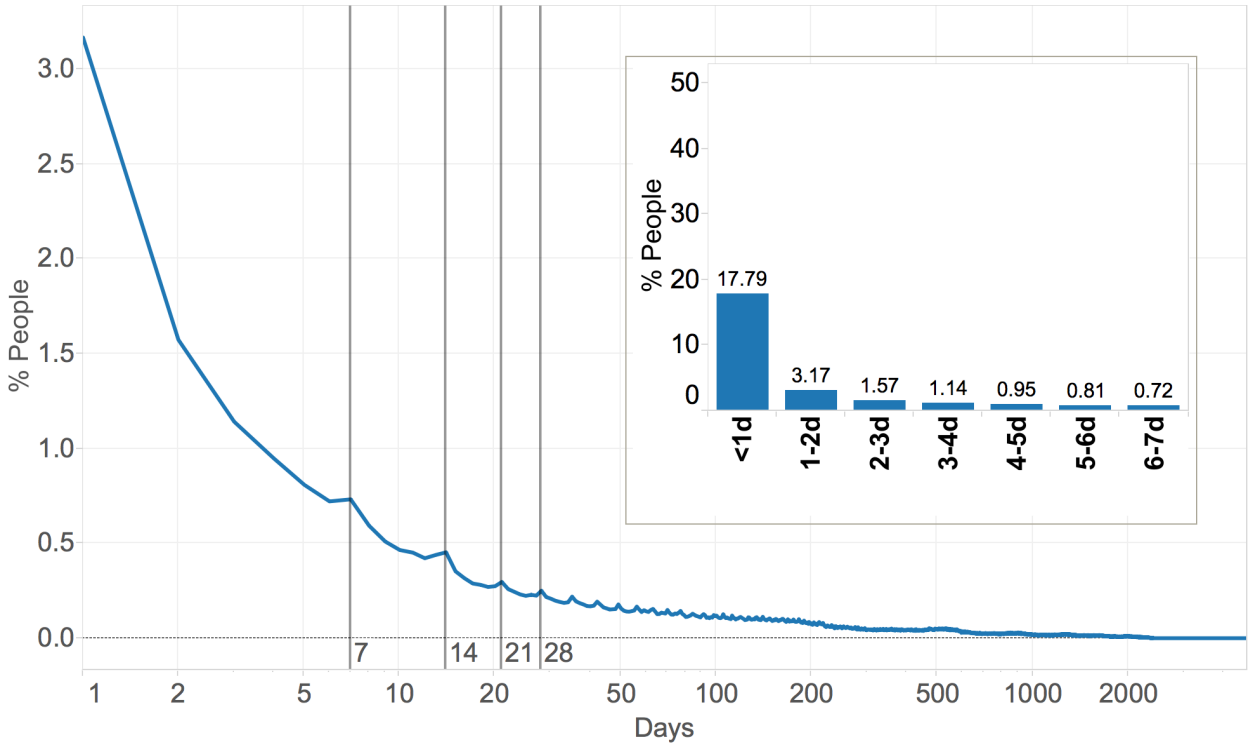


Figure 17: Number of people that showed activity during logging, showing time between registration date and their last recorded activity on the site. Registration time (days) is on a logarithmic scale. The inset shows a bar chart visualisation for the first seven days. Note that 0 days (<1d) is not on the main chart due to the logarithmic scale.

The results show that there are a lot of temporary players on PlayOK (the leftmost column of people who spent less than a day is the largest). The data also shows a substantial population of 'older' members who have been on the site for over six months and that there are a small number of people that still participate in the site after several years, including some who registered before January 2004, the first month that registration dates were recorded.

Do people spend a lot of time on PlayOK?

To get a more nuanced view of activity, I refined the analysis in the previous subsection to not just look at the amount of time since registration, but how much time the players actually spent logged in. To do this, I divided the player population into groups based on their level of activity: **Power** players are the smallest number of players that were responsible for 80% of the total logged time on the site (based loosely on the 80/20 rule); **Transient** players had three days or less between registration and final activity; **Minimal** players were around for more than three days but logged in for less than 15 minutes each week between registration and final activity; and **core** players are

everyone else, with middling amounts of involvement in the site. I put all those who registered in the final two weeks of logging in the **unassigned** category, as there was not enough information about their usage habits. While the definitions of the categories are somewhat arbitrary, the exact values are not critical, as the categories serve simply to give a rough sense of the distribution of use of the site population.

Even with such a conservative definition of transient, almost 20% of the population shows this very low level of commitment (Figure 18). In addition, almost 50% of the population has minimal use, which is also a very low bar for use. Almost 80% of the player population is either transient or using the site very little.

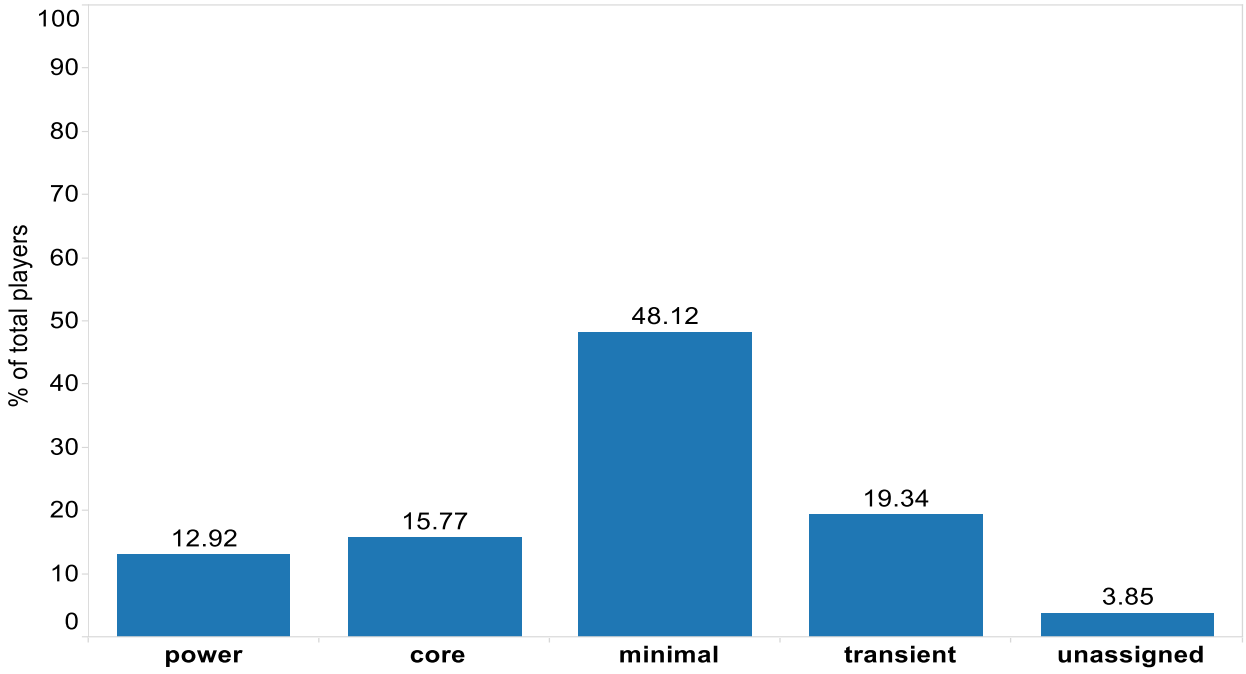


Figure 18: Proportions of different types of players.

Social Interaction

Social interaction in PlayOK takes two forms: game interactions (doing things together), and verbal communication (talking together). I analysed how much people played games and how much they sent chat messages in some more detail than the average games and messages per person figures presented earlier in this chapter.

How much do people play together in PlayOK?

Real world social groups do things together (e.g., a cycling club rides, a board game club plays games). The activity is an important part of social interaction, so I analysed how much people play games in PlayOK. There were more than 60 million games played in three months. The game type with the most number of games was chess, which had approximately 8.7 million games during our logging period. Overall there is a lot of gaming activity on PlayOK.

Calculating simple statistics shows that, over the three months, PlayOK players played an average of 10.282 games each, and the median was 3 games. However, this gives no insight into the distribution of games played by the many people on the site. Figure 19 shows a more detailed view of games per person for the three months of logging and it is apparent that there is a lot of variation: for example, about 38 000 people played ten games, and less than 2 000 played 100 games. However, there is a large group that plays only a few games, and the largest group of people played only one game.

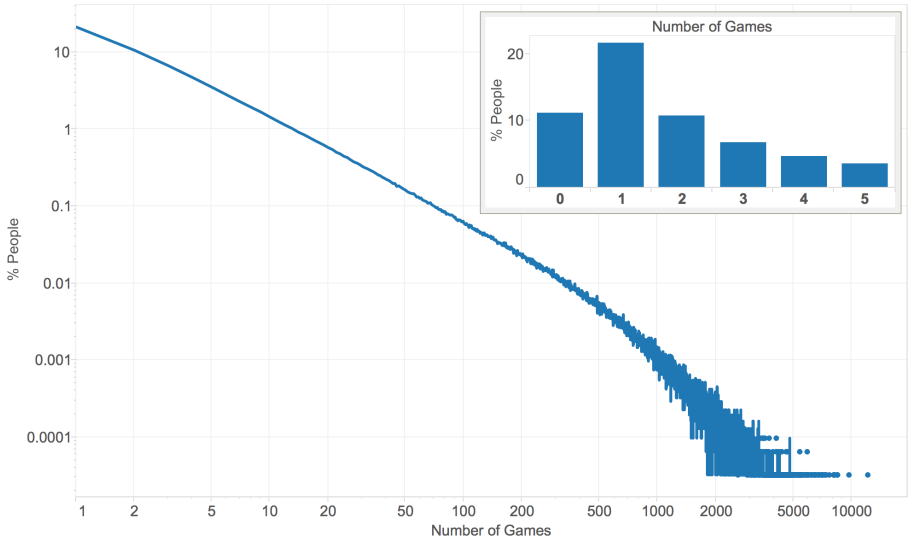


Figure 19: Proportion of players who played n games. Log-log chart. The inset shows the proportion of the players that played 0-5 games (0 is not on the big chart due to the log scale)

How much do people communicate verbally in PlayOK

A common characteristic of social groups is that when people get together, they talk. Verbal communication in PlayOK occurs through three types of text chat: room messages to everyone in a game room (Figure 1), table messages to the people at a single game table and private messages to a particular person (not shown).

Although the total number of chat messages over the study period was large (Figure 3), this is an artefact of the large population of the site; the overall finding is that there is very little verbal communication on PlayOK. There was an average of 1.116 messages per person per day across all game types and including in game messages, public messages, and private messages.

My observations showed a distinct lack of several types of verbal interaction that one might expect in a social space: ordinary conversation, 'polite' communication such as greetings or departure messages, and the 'articulation conversations' normally seen at the start and end of a game (e.g., who will sit where, who will deal the cards, etc.).

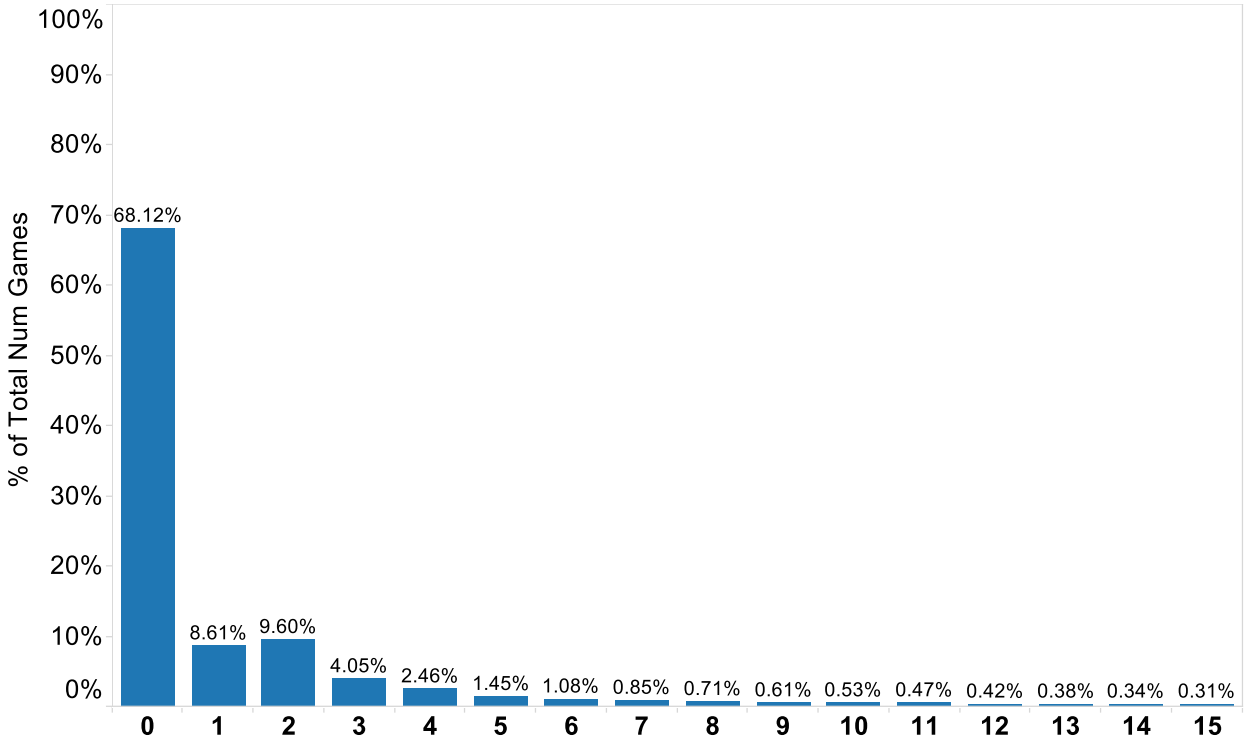


Figure 20: Histogram of number of chat messages per game.

Relationships

I looked at two questions to explore the ways that people can form ties and associations with others in PlayOK: how do people find opponents when they want to start a game; and do people play (or talk with) the same people over time.

How do people find opponents in PlayOK?

The primary interaction on PlayOK is playing games, and so I wanted to find out how the games were started, giving insight into the beginnings of potential social ties.

There are four ways people can get together to start a game:

- There is an established gaming relationship;
- A conversation leads to a game;
- One player invites another to a game;
- A player creates a table and waits for opponents.

The survey responses provide evidence that these strategies exist. One person reported only ever playing with the same group of friends (category 1). Another reported that he configures a table with specific settings, and waits for someone willing to play (category 4). During my time on the site, I received many invitations to play (category 3). Despite not being mentioned explicitly in the survey, I added category 2 for completeness. Categories 1 and 2 are social while 3 and 4 rely solely on the interface.

I classified every opponent pair; skipping the first two weeks, since category 1 relies on historical information (I used "opponent pairs" instead of games as a more fundamental unit for this analysis; a four person game has six pairs). To classify a pair playing a game, I applied the following rules in this order:

1. If the pair had played more than two games previously, it was classified as category 1;
2. If there were more than two messages in the five minutes prior to the game start sent by one of the pair and received by the other, the pairing was classified as category 2;
3. If there was an Invitation sent in the five minutes prior to the game start sent from one of the pair to the other, then it was classified as category 3;
4. Everything left over was classified as category 4.

The thresholds were somewhat arbitrary but chosen to be favourable to the sociable categories (1 and 2).

Figure 21 shows the frequencies of the different starting conditions during the logging time. The majority of games start with a player setting up a game table and waiting for opponents, suggesting that most games are between strangers. However, almost 30% of opponent pairs have a game history, indicating that relationships are being formed and maintained to some degree. I investigate this in more depth in the next subsection on small groups.

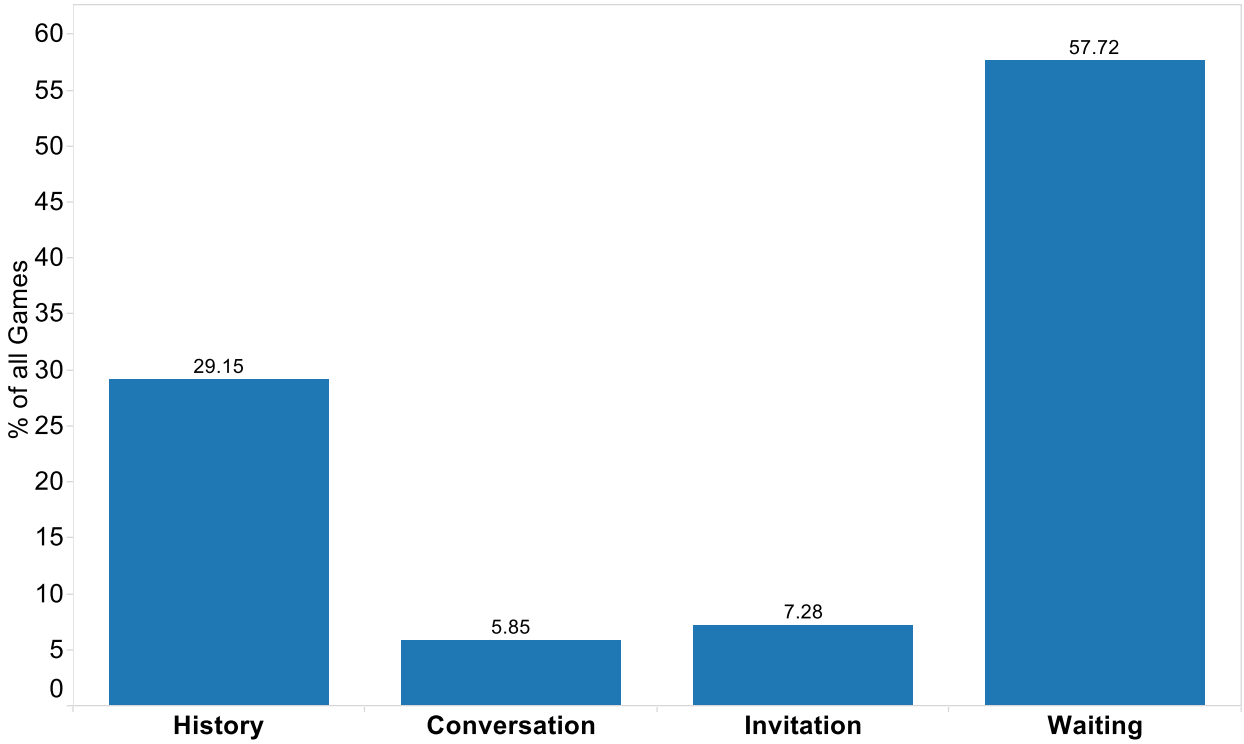


Figure 21: Comparison of starting conditions for PlayOK games.

Do people play (or talk) more with a small group?

A common property of larger groups is that people associate more with a smaller subset of people. To look for group-forming behaviour in PlayOK, I looked at the amount people played with each opponent, at the time between repeated games with an opponent, and at the rate people added new opponents over the log period.

Frequency of playing against different opponents. Figure 22 shows the frequency of repeat games played against each player's top 50 opponents. People do play against their most frequent opponents much more often – on average, over 50% of a player's games are against their top three favourite opponents. This suggests that PlayOK players are maintaining small sets of favourite opponents with whom they spend most of their time. The favourite groups are small, however, and the graph quickly tails off, suggesting that outside the small group, partner selection features many more strangers.

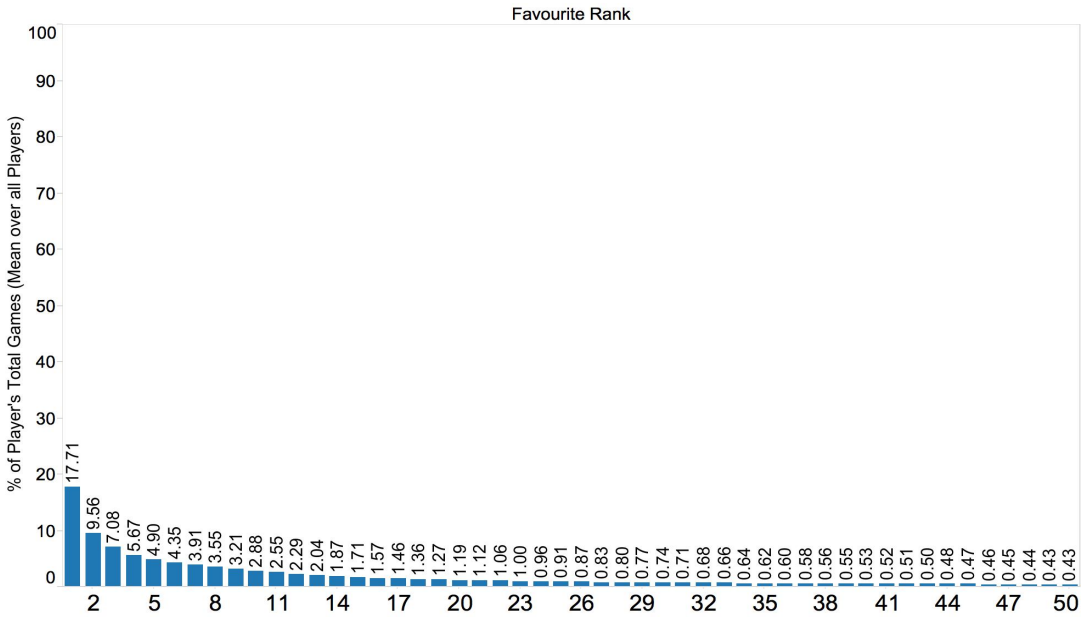


Figure 22: Average proportion of games played with each of their top 50 favourite opponents. X-axis is the 'favourite' rank of the opponent, e.g. leftmost bar is average games against the favourite opponent. Only includes players that have played at least 10 games.

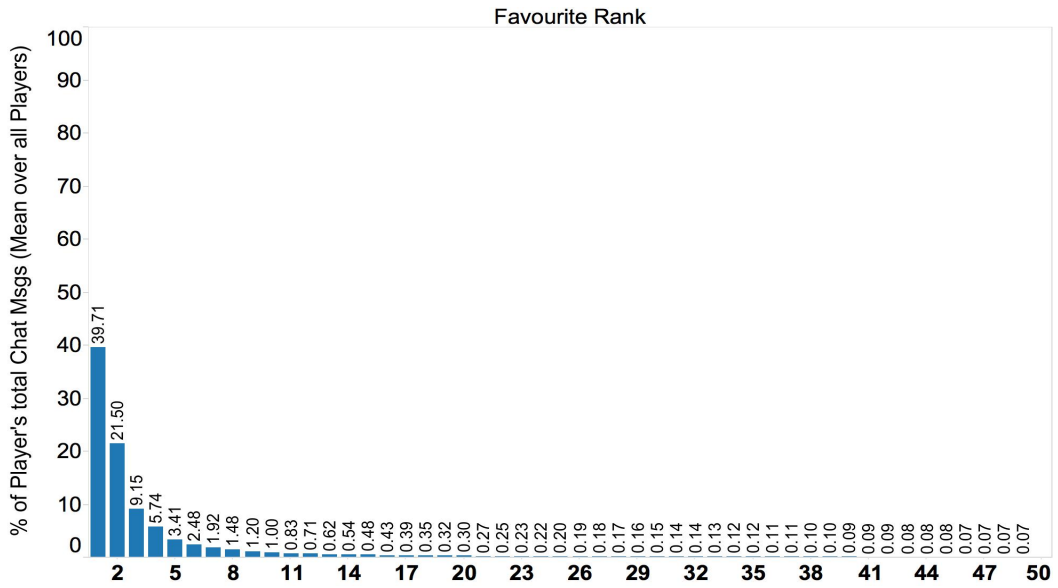


Figure 23: Proportion of chat messages sent to each of their top 50 favourite chat partners. X-axis is the 'favourite' rank of the opponent. Only includes players that have sent at least 10 messages. Analysis is based on messages sent in a game table only.

A similar situation exists for chat partners (see Figure 23), showing that players are again maintaining sub-groups of partners, though once again the groups are small. However, chat messages to the small group of favourites is much more frequent than game playing – on average over 70% of in-game chat messages are to the top three favourites.

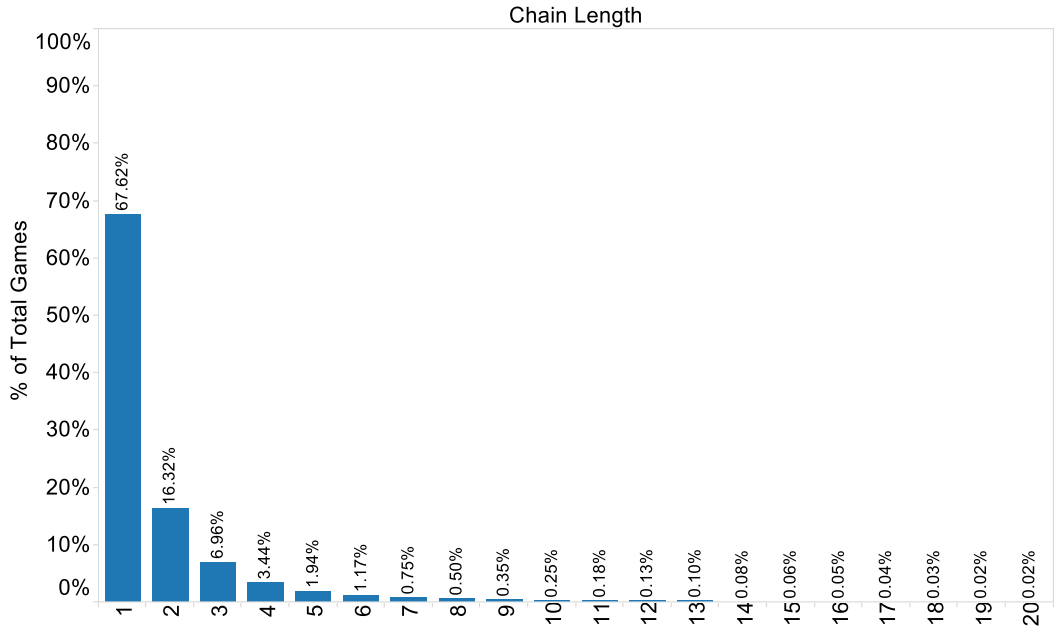


Figure 24: Proportions of games played in different length of chains.

In real-world groups, people will often do something with a person a second time after meeting them (if the first encounter was positive). To look for this effect, I counted the number of

games between repeated games with the same opponent. Figure 24 shows the proportions of these game chains of each length. The great majority of them (nearly 70%) only have length one – that is they are single games. Even with the convenience of already being at the game table, which makes it easy to start another game, most players found new opponents after just a single game.

Last, I examined how much people played new opponents. Figure 25 shows the proportion of games that were between opponents that had played each other before. Overall, 55% of opponent pairs are seen for only one game.

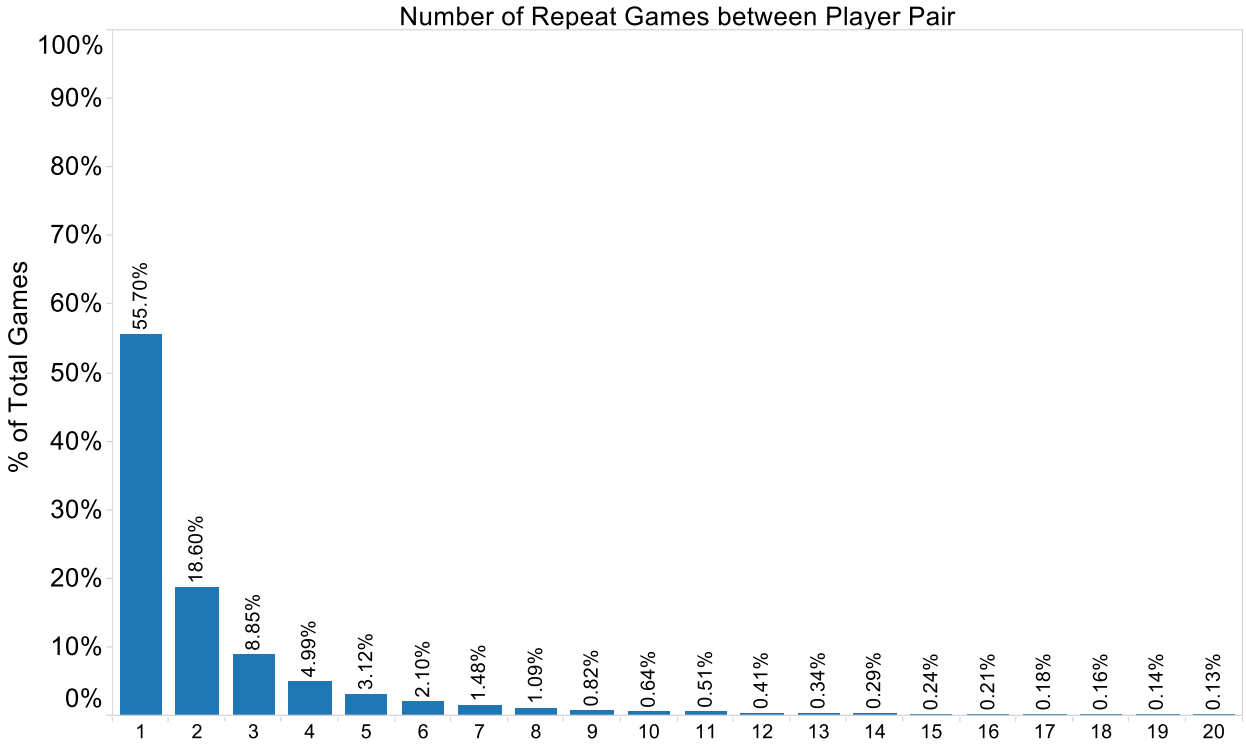


Figure 25: How often opponent pairs are repeated.

Discussion

Summary of Findings

Virtual place: The PlayOK site is designed around playing games and all page layout and transitions have been created to facilitate starting and playing a game. Other functionality, such as interacting with other players, is in support of the main goal of playing games.

People: While I have only a little insight into the characteristics of the PlayOK players, I am able to determine that they come from a wide range of linguistic backgrounds. As shown in chapter 3, the majority of players have chosen Polish for their display language.

Persistence: PlayOK has a highly transient population, with most people leaving very soon after joining, and a slower reduction in player numbers over time. However, some players stay for long time periods.

Social interaction: Shared activity is ubiquitous in PlayOK, with people playing numerous games with a variety of partners; however, verbal interaction is not common, with 70% of games occurring without any chat messages at all. In addition, the majority of games are started without any social history or interaction.

Forming ties: People do form some ties to other players, in that they play and chat more frequently with a small subset; however, they also often play with opponents outside this set – 55% of opponent pairs only occur once.

In the next sections I consider explanations for some of these results, and then turn to the questions of what the results mean for understanding sites like PlayOK, and whether there are potential benefits in a site where interactions are relatively impersonal and activity-based.

The Nature of Social Interaction in PlayOK

By most characterisations of communities or social groups, the PlayOK site is a failure – the people on the site don't talk to one another, don't stay long enough to make a commitment to the group, and only make a very small number of lasting connections with others. We begin by considering potential reasons for the lack of conversation.

No time for talk. In some games, the low message rate can be partially attributed to the speed of the game – many games in PlayOK are timed (e.g., chess or backgammon), and turns happen rapidly (on the order of seconds). In these situations, there is little time for typing chat messages.

Game moves as conversational turns. Many chat messages in PlayOK were not part of a clear verbal conversation, but comments on an action that had just occurred in the game. For example, a player in a Euchre game wrote "and yet there's no value in it", an odd statement given that this was the only chat message for several minutes. This comment followed the winning of a trick, and appears to be about taking a valueless trick. There may be other kinds of 'conversations' going on than those simply made up of chat messages. In particular, game actions appear to play a similar role as utterances in conversations as detailed in Clark's book "Understanding Language" (Clark, 1996). To follow the analogy, the players enter the game with a great deal of common ground – they know the rules of the game and the goal of the interaction. As they make moves, they build a shared understanding of the game and each other as players. To an experienced player, game moves can be incredibly rich in the information they convey. These structures are not verbal utterances, but can play the role of an utterance, and can be responded to with a subsequent statement. In the above example, taking a trick in Euchre is also a statement (i.e., "I am taking this trick"), providing context for subsequent statements (verbal or otherwise). If this interpretation is correct, there would be less necessity for explicit verbal interaction as the game moves would fill the same role.

Game structures replace social conventions. The game interface provides mechanisms that render unnecessary certain kinds of conversations that are used in the real world to organize a game session. For example, the interfaces for games in PlayOK list the players and place them in locations at the game table, meaning that the players do not need to ask each other's names or talk about who will sit where. The interface also shows user profiles (e.g., country and rating) and game history, which frees players from having to use verbal communication to find out this information. In addition, the interface provides mechanisms for aspects of game control, such as inviting a player to join a game, or starting a game once players have joined. The results show that the majority of games start with no social interaction at all and simply rely on the interface. Last, players' entry and departure from a game table are automatically indicated as system messages in the chat transcript; these messages may take the place of standard "hello" and "goodbye" conversations in real-world settings.

Language barriers. PlayOK was created in Poland and the user base is still predominantly European, spread across many countries. While the majority of the players speak Polish, there are many other languages represented, and so playing the games could be viewed as the shared language. In the cases where there is no common spoken language, there is no possibility of verbal conversation.

Given the lack of conversation, it is of particular interest how this site has managed to succeed so well in terms of two more basic measures of health: PlayOK is doing very well in terms of both longevity (more than ten years) and population (over five million registered members). I use the logs, my experiences with PlayOK, and survey responses to explore possible explanations for its health.

In particular, I explore the idea that the kinds of patterns seen in the PlayOK logs are legitimate forms of social interaction – even without extensive conversation, formation of subgroups, or long-term commitments. In this exploration, I consider three main ideas: first, that the interactions *within* the games on the site are a kind of social interaction; second, that the impersonal and anonymous interactions on PlayOK are legitimate social interactions that fill particular human needs, and that have parallels in a variety of real-world settings; and third, that the 'unconnected interactions' of game sites like PlayOK are a setting for *sociability*, a kind of interaction where personal issues and deeper implications are explicitly pushed away, and where the goal is to interact with other humans in an intentionally superficial, but explicitly social, fashion.

Actions in games as social interaction

Multiplayer games clearly involve interactions with other people – such as the moves in board games, or the bidding and trick-based play in card games. These interactions have not been widely considered in definitions of community or in analyses of social dynamics, but they are legitimate forms of human contact that create a shared experience through a (albeit stylized) form of human interaction.

There are two ways in which game actions stand as social interaction. First, as described above, actions in games appear much like conversational turns – for example, each move in a chess game is like an utterance, with experienced players reading as much from a move as people do when interpreting a verbal utterance. If we consider games as providing people with a new language, we must reconsider the apparent dearth of conversation seen in our analysis, since 'speaking the language of the game' through play can represent a rich form of communicative interaction.

Second, the activity-based interactions of games can also be considered as a different kind of human social interaction, one based on the creation of an experience rather than one based on the establishment of shared knowledge, trust, or common bonds. The experience created by the game is, after all, a primary reason why people play – as noted by Stenros and Waern (J. Stenros & Waern, 2010), gameplay as activity and as interactivity feature prominently in many classic definitions of

games (such as those by Huizinga or Caillois, see (J. Stenros & Waern, 2010) p. 3). Gameplay is an *enacted experience* – an experience that occurs only because it is created by the players themselves (J. Stenros & Waern, 2010). Recognizing the central role of this kind of experience gives legitimacy to the "I'm just here for the games" attitude evident in many of the survey responses – that is, the games are enough to make a complete experience, even without other types of social interaction such as talk or friendships. As Stenros and Waern state, "for players of a game, the purpose of playing is […] paratelic: the activity of playing a game is not a means to an end but the end in itself" (p. 5). Thus, saying "I'm just here for the games" does not necessarily make players anti-social, but rather focuses on the created experience that the game enables.

Previous research into online game interactions has also noted this concept of gameplay as a surrogate for verbal interaction. In an ethnography of a combat MUD, Muramatsu and Ackerman (Muramatsu & Ackerman, 1998) saw little traditional interaction and noted that non-game conversation was rare, but instead observed that players acted together to play the game through conflict and cooperation. Brown and Bell (Brown & Bell, 2006) call this type of activity "performing" a friendship in their study of the virtual world *There*. They argue that acting together around objects (called "social action") builds up a shared history of collective experiences. (Ducheneaut, Moore, et al., 2007) also consider social activity in their analysis of an MMOG and discuss the conflict between "instrumental" and "social" play present in many online games.

This type of social interaction *around* the game should be differentiated from social interaction *mediated* by the game (Jaakko Stenros, Paavilainen, & Mäyrä, 2009b). In many situations a game is a means to an end, and a social end at that (e.g., getting together to play cards, where the game is really just an opportunity to be together with one's friends); however, the discussion above indicates that it is also valid to see the games themselves *as* the social activity, and therefore an authentic end in themselves.

Impersonal interaction

Player interactions in PlayOK are often anonymous and impersonal, and most players do not appear to make any lasting social connections with others on the site. Although impersonal interaction is sometimes seen as a sign of a failed community, there are real-world parallels suggesting that there may be more going on here than meets the eye.

Three examples of impersonal interaction in the real world can help to indicate some of the nuances. First, 'gay bathhouses' have existed for many years, where homosexual males go to obtain

sex without emotional commitment or extensive social interaction (Bérubé, 2003; Haubrich, Myers, Calzavara, Ryder, & Medved, 2004). These establishments have been the subject of much discussion, sometimes about the superficiality and lack of connection also seen in the game sites (Haubrich et al., 2004); nevertheless, bathhouses are a lasting and successful part of many communities (Bérubé, 2003).

Second, there are activity-based groups that exist primarily for the shared activities they enable (e.g., a pick-up sports game facilitated by a recreational centre). Interactions between participants in these groups can be anonymous and highly impersonal. Although players in a pick-up sports game or on PlayOK may choose not to socialize with their team or opponents as part of the experience, these activity-based groups fill a role of providing a venue to perform shared activities without the need for social investment.

Third, there are situations where people make contact with others, but where the interactions are highly abstracted and where the participants have no interest in forming longer or deeper associations. One example is the amateur radio community, where people explore the airwaves and look for other stations to contact. These interactions are brief and impersonal (often limited to the exchange of station IDs), but are still an important part of this group's activities.

In addition to these physical-world examples, impersonal interaction has also been observed in virtual settings, for example (Ducheneaut, Moore, et al., 2007) observations of healing and entertainment in the Star Wars Galaxies MMORPG.

The important thing about these examples is not to say that impersonal interactions are necessarily good or bad, but that they exist in real-world settings, and serve a variety of needs. Human-human interactions have a 'degree of anonymity' continuum, and the different points along this continuum are valuable for different purposes. In particular, both effort and risk on impersonal interactions are reduced – people in PlayOK can move quickly to the activity of the game, without worrying about whether they will 'get on' with their opponent. This idea that surface-level interactions have an important role leads to the idea of sociability.

Game sites as settings for sociability

In addition to being at least somewhat impersonal, game-based interactions are highly structured by the rules and environments of the games themselves. This kind of interaction can be thought of as a form of *sociability*, a concept described by the sociologist Georg (Simmel, 1949), and

later used to describe online environments such as MMOGs (Ducheneaut, Moore, et al., 2007) and social VWs (Brown & Bell, 2006).

Simmel describes sociability as "association for its own sake" without the burdens that often accompany interactions in society. In sociable interactions, the deeper and more contentious aspects of human relationships are intentionally left out, and people interact in a formalized or rule-governed fashion that ensures that the interaction is successful and satisfactory for all participants. For example, the rules of 'polite conversation' ensure that settings such as a conference reception can proceed smoothly and safely for all parties – contentious issues such as religion or politics are left out of the discussions.

Although Simmel is interested in situations where conversation is the main mechanism for interaction – and this has been the primary application of the idea in previous CSCW analyses (Brown & Bell, 2006; Ducheneaut, Moore, et al., 2007) – sociability can also be considered in the setting of a game site, where game-based interaction largely replaces verbal communication, and where the rules of the interaction are formally constrained by the rules of the game. Although Simmel does not explicitly consider games, he touches on this connection in several ways. He calls sociability the "play-form of association" (p. 255) and suggests that it is an abstraction of other real-life interactions, making sociability a kind of practice for other situations and settings. This echoes the correspondence between games and real life – many games are abstracted representations of real-world activities. For example, board games such as chess are derived from the tactics of war; bidding games like bridge are abstract versions of negotiation and bargaining; and board games such as Diplomacy simulate the development and maintenance of political alliances. As Simmel says, "And what joins art with play now appears in the likeness of both to sociability. From the realities of life play draws its great, essential themes: the chase and cunning; the proving of physical and mental powers, the contest and reliance on chance and the favor of forces which one cannot influence" (p.255).

Game environments can therefore be thought of as sociable settings where the distance between the activities and the real world is somewhat greater, and the 'play-form' is more concrete. This idea comes through again in Simmel's discussion of the importance of equality in sociability: these situations involve people "who give up so much of their objective content […] that they are sociably equal, and every one of them can win sociability values for himself only under the condition that the others, interacting with him, can also win them" (p. 257). This sounds very much like the way that games ensure the equality of players, each of which has an equal chance to win (although, it

is clear that game environments are not as interested in equal *outcomes* as Simmel's sociable settings are).

Although researchers have considered sociability in other online environments, and even in online game environments, e.g. (Ducheneaut, Moore, et al., 2007), the idea of games as a setting for a more extreme kind of sociability – with the activity-based interaction and formalized interaction boundaries that games provide – has not been considered previously. Although I do not argue that these environments provide all of the social interaction that a person needs, it seems clear that there are some deeper and more interesting characteristics in game sites than previously thought, and that game play can represent a different kind of interaction that should be considered further in future analyses.

Benefits of Impersonal and Activity-Based Interaction

There are several potential benefits to the kind of interaction and structure that is seen in a game site:

First, the dominance of impersonal and anonymous interactions implies that as long as there are enough people in the environment, it is always possible to get the experience – that is, it doesn't any longer matter *who* is there, as long as *someone* is there. The large number of people on the site means that it is generally easy to find a person to play against; although less personal, the scale effects of the Internet greatly increase the interaction possibilities. For the same reason, longevity of members is also not important – the high turnover rate of a site like PlayOK is not a problem. The anonymity of the site may also allow people to test their abilities in a less risky fashion than in a real-world setting – for example, it may be easier to challenge a high-ranked player in an anonymous setting.

Second, the structures and rules imposed by games mean that each game provides its own 'language,' overcoming language and cultural barriers. As long as a person knows the rules of the game, she can play with anyone else. Given a situation where people share little linguistic or cultural common ground, the ability to rely on the game structure for organizing and regulating the interaction is critical.

Third, game sites support a wide range of interaction styles, from anonymous players through to groups of friends. This may be important as it provides a large player base so that even well-connected players can gracefully transition to anonymous play when their friends are not online.

Although largely ignored during anonymous play, game sites also provide the communication tools needed to interact more personally with friends and acquaintances.

Fourth, the low barrier to entry in terms of time, effort, and emotional investment matches the general idea that the sites are primarily for fun. Similarly, the low cost of interaction afforded by the social actions in games played for fun means that the interaction is safe – there is little likelihood of social awkwardness, rudeness, giving or taking offense, or the raising of sensitive political or religious topics.

Fifth, the maintenance and recognition of social standing are still possible in a game site through the player rankings that are listed on the site. This idea that the large player population can be seen as an audience for a high ranking is similar to previous studies where people appreciated being in a large milieu (or showing off to that large audience) even though they did not interact with them (Ducheneaut, Yee, Nickell, & Moore, 2006b).

Finally, there is a value to the players in challenging a human opponent. While PlayOK does not offer the ability to play against a computer opponent, it is easy to find single-player computerised versions elsewhere. Artificial intelligence opponents can play at least as well as advanced human players in most games. I speculate that playing against a human allows for more diverse play experiences, greater opportunities for learning and improvement in strategy, and potentially a greater feeling of accomplishment after a win. Although PlayOK does not provide player-vs-AI games, comparing to these types of games could offer further insight into the issues that I have raised here; I plan to investigate this in future work.

Implications for Design

One hypothesis that I considered in the early part of the project was whether the user interface of a site like PlayOK constrained possibilities for social interaction, and whether redesigning some of these tools could help to make the site more social. Although it does appear that the interface is somewhat awkward for social interaction, it does not seem likely given the other analyses that this is the main reason for the observed behaviours. In fact, it may be counterproductive to improve the representations of people, or enhance the system's capabilities to better support communication; doing so might reduce the value of the site as an abstracted and sociable setting as described above. For example, providing an audio channel for verbal communication in every game might cause problems for sociability rather than benefiting social closeness.

The analyses also suggest the importance for these game sites of maintaining easy and anonymous entry, so that players can get in and play. However, supporting seamless transitions from anonymity to pseudonymity is also important so that players can become more involved in the community in terms of their rank, profile, game history, and contacts.

Perhaps unfortunately for those creating online game sites, the importance of impersonal interactions emphasises critical mass requirements. This is a common problem in CSCW systems in general but the analyses here indicate that there needs to be someone to play games with at all times. In addition, most visitors to the site are transient or spend little time logged in. Both of these factors lead to a requirement for large numbers of people.

Conclusion

I carried out a three-month log analysis of the PlayOK online game site to determine how people behave socially in this kind of environment. I organized the study around five requirements of community: a virtual place, a group of people, persistence, social interaction, and relationships. I found that while the site seems very social when considering games played and subgroups of opponents, other analyses showed that the population was highly transient, and that people engaged in very little verbal communication.

To explain how a game site can continue to be large and popular without some of the hallmarks of social groups, I explored the idea that games and game-based activity can take a larger role in our view of human interaction. I discussed three ways in which group behaviour in PlayOK can be seen as legitimate and valuable, including ideas about game actions as social interaction, the value of impersonal interaction, and game sites as settings for sociability. These properties of the PlayOK virtual community provide many benefits such as requiring a low level of commitment from players, which means there is a low barrier to entry, meaning there are more people. The larger population, even if it is transient, supports those just interested in finding someone to play against. PlayOK's flexibility in supporting many interaction styles supports groups of friends, those seeking recognition for their playing ability, those just interested in a passing game against a person, and many others, regardless of language barriers.

CHAPTER 5
COMPARING SITES: THE EFFECTS OF POPULATION SIZE

The previous chapter explored community behaviour in the PlayOK BCG site and resulted in a better understanding of one type of successful BCG community. However, without comparison to other communities, it is impossible to judge the influence of the various properties of BCG sites on community behaviour.

Having some understanding of how different properties of the community affect behaviour is important because it allows designers to design for particular types of community and allows site administrators to better manage the current community. PlayOK is a single example and comparison with other examples adds to understanding of BCG communities.

In this chapter, I compare PlayOK with the GameCenter BCG. I investigate the same five requirements of community that I focused on in the PlayOK analysis – the virtual place, the group of people, social interactions, permanence, and relationships. I then relate the similarities and differences to the community topics that arose in the previous chapter's discussion: game actions as social interaction, impersonal interaction, and game sites as settings for sociability.

Expectations

The two BCGs, while being similar in setup and high-level purpose, are also different in a number of important ways. These differences are discussed in Chapter 3. Both sites are successful in the sense that they have been active for many years. PlayOK is about 1,500 times larger in terms of population, is mostly Polish, and is based on providing a virtual place to play games. In contrast, GameCenter is much smaller, has Russian and English language groups, and supports two strong sub-communities – game designers and Toguz Kumulak players – as well as a third sub-community of the casual players of other game types.

These differences lead me to expect, at a high level, that GameCenter will be more traditionally social than PlayOK. That is, I expect more persistence of membership, more verbal social interaction, and stronger relationships. I believe GameCenter has these properties because the site does not have the extremely large population of PlayOK to sustain the same kind of impersonal interaction. To be explicit in my expectations and to aid in referring back to them in the analysis, I have listed them below with a statement of the expectation, some reasoning for why I think it will be true, and the data analysis results that will confirm it.

Expectation 1. GameCenter players will stay members for longer than PlayOK players.

Reason: I have two reasons for this expectation. First, GameCenter has two unique, or at least rare, motivations for members – game design and Toguz Kumalak (Toguz). These two motivations are difficult to find elsewhere and so are likely to result in more committed members. Second, experts in both game design and Toguz are likely to be drawn to the site, resulting in social capital for the site, which in turn will draw other players who want to take advantage of the expertise – similar to the Internet Chess Club (Ginsburg & Weisband, 2002b).

Expected Results: Length of membership is measured by the time between registration and last activity on the site. There will be a substantially higher proportion of GameCenter players with long memberships than PlayOK players.

Expectation 2. GameCenter players play fewer games than PlayOK players.

Reason: The impersonal nature of PlayOK games, explored in the previous chapter, is ideally suited for players to play multiple quick games in as short a time as possible.

Expected Results: PlayOK will have more games per player than GameCenter.

Expectation 3. GameCenter players chat to each other more than PlayOK players.

Reason: In the game design sub-community, the primary expression of their interest is in discussion, as they talk about the design of existing games and ideas for new games. This will result in more chat in GameCenter. I also expect the other members of GameCenter chat more than PlayOK as well. Because there are many fewer people in GameCenter, they are more likely to encounter each other more frequently, resulting in increased familiarity, which is likely to translate into more conversations.

Expected Results: There will be more chat messages per GameCenter player that chat messages per PlayOK player. The higher rates of chat will be true both for public chatting and in-game. Many messages within single games (i.e. conversations) will be more common in GameCenter.

Expectation 4. GameCenter games will start based on conversation or gaming history substantially more often than PlayOK games.

Reason: The smaller size of GameCenter means that players that are about to start a game are likely to have played against each other before. As in expectation 2, GameCenter players are expected to converse more than PlayOK players, and this is likely to extend to starting games. In

addition, GameCenter lacks the invitation feature that is present in PlayOK, forcing some extra articulation work to coordinate starting games.

Expected Results: The proportion of games started between opponents with a history of playing games will be substantially higher in GameCenter than in PlayOK. A similar difference will be evident in the proportions of games started by conversation between opponents.

Expectation 5. GameCenter players form ties with other players more than PlayOK players.

Reason: The smaller population and focused sub-communities present in GameCenter likely result in more interactions with the same people and lead to more familiarity. This greater familiarity in turn results in forming friendships that are expressed by doing things together (playing games) and talking.

Expected Results: Where PlayOK players show a small number of favourite opponents or chat partners, GameCenter players will have a more even distribution amongst a larger group of favourites.

Results

In this chapter I repeat the analyses from the previous chapter, comparing and contrasting PlayOK and GameCenter. Where relevant, I relate the results with the expectations outlined above.

The analytical approach is outlined fully in Chapter 3. The structure is based on behavioural community theory, following the five components: virtual place, group of people, persistence, social interaction, and relationships. Each analysis uses social accounting methods, which involves a presentation of community activity counts, such as chats sent or games played.

The Virtual Place

Many online games sites could be considered successful; they have large user bases (in the thousands), host tens-of-thousands of games every month, and are long-lived (lasting several years). PlayOK and GameCenter are both successful game sites that offer similar functionality – they are free, they offer many different game types, and they provide similar means of communication – yet they offer different community experiences. I have described the sites in detail in Chapter 3.

While both offering many similar game types, the sites do differ in the game types offered. PlayOK offers standard, well-known games, and has a relatively even spread of game types with different numbers of chats and games played. In contrast, GameCenter offers many obscure games.

Toguz Kumulak dominates activity on the site, though there is also a lot of chat in the Hex and Sandbox games. Toguz Kumalak is a popular game in central Asian countries such as Kazakhstan and Uzbekistan and GameCenter is the only site on the web that offers real-time play. The Sandbox is a special game type in GameCenter to support game designers. A generic board can be set up in several configurations and no rules are enforced by the system. Designers can set up a newly created game and get other people to play through it and comment. This process would explain why there are relatively few games but such a high number of chats in the Sandbox.

The Group of People

In the Chapter 3 subsection "People and Activity", I outlined the available information about the people in GameCenter and PlayOK. The numbers presented in that section showed how the PlayOK population is much larger than the GameCenter population, and PlayOK players are predominantly Polish while GameCenter players are mostly Russian or English speaking. PlayOK games range over different sizes as measured by numbers of people, games played, or chat messages sent, whereas GameCenter has a dominant subcommunity of Toguz Kumulak players and smaller participation in other game types.

Persistence

How long do people stay active?

In Figure 26, I chart how long the players on each site stay. I measure the length of membership by the number of days between registration and their last activity on the site. There are two features in the chart that I would like to highlight. First, almost half (49.58%) of GameCenter players are on the site for less than a day. This is in contrast to less than a fifth (17.79%) of PlayOK players. A much larger proportion of the GameCenter players are registering but not staying on the site. Second, after that initial difference on the first day, the two sites are very similar in their membership patterns, and the proportion of the population that stays for a particular number of days varies by less than 1% between the two sites.

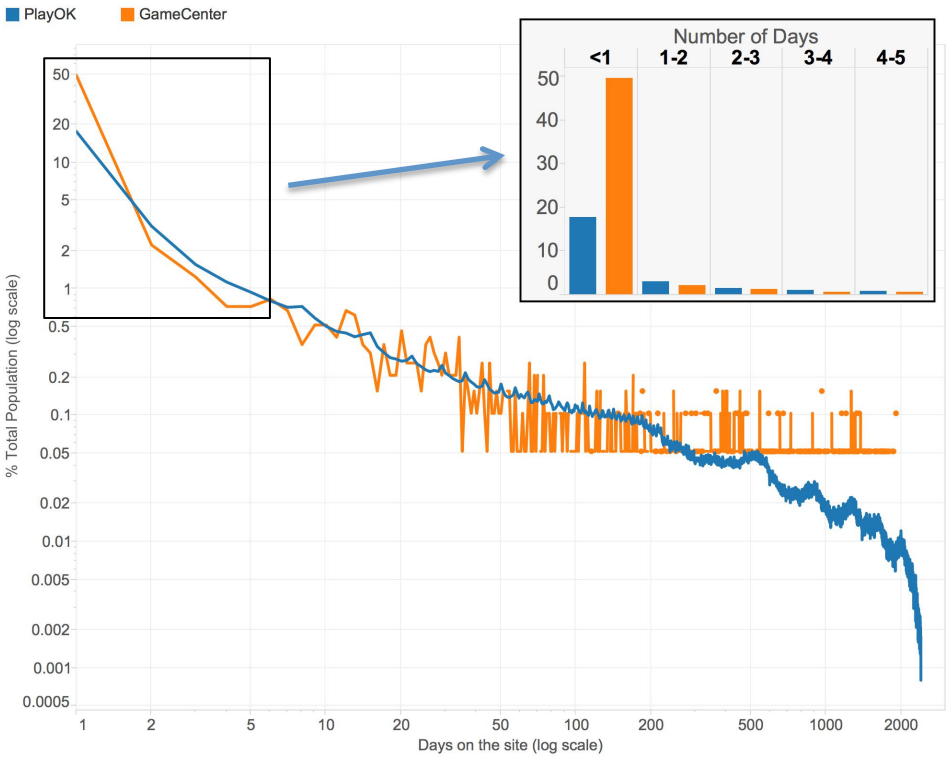


Figure 26: Lengths of time spent on the sites; measured by number of days between last activity and registration. The differences in the curves are only at the tail end and are due to the differences in size of the sites – i.e. a single player in GameCenter is about 0.1% while a single player in PlayOK is less than 0.0001%. The inset is a bar chart comparing the first five values as the difference in the first value is less apparent on the logarithmic scale.

My expectation was that GameCenter players would stay active on the site longer (Expectation 1). The chart shows that this is not the case. A substantially higher proportion of GameCenter players stay for less than a day and after this difference the two sites are very similar in length of memberships.

Do people spend a lot of time on the sites?

As with PlayOK, I divided the player population into groups based on their level of activity. I used the same category definitions as in the analysis of PlayOK in the previous chapter, and these categories are summarised in Table 14 and the proportions of players in each category are shown in Figure 27.

Table 14: Player categories for levels of use.

Category	Definition
Unassigned	Registered in the final two weeks of logging.
Power	The smallest number of players that were responsible for 80% of the total logged time on the site (based loosely on the 80/20 rule).
Transient	Three days or less between registration and final activity.
Minimal	Members for longer than three days but logged in for less than 15 minutes each week on average.
Core	Everyone else, with middling amounts of involvement.

GameCenter has a substantially higher proportion of core players, which are the players that have a non-trivial level of participation over time. This does not extend to power players though, where GameCenter has a smaller proportion. GameCenter has many more transients, as was highlighted in the previous subsection on membership length.

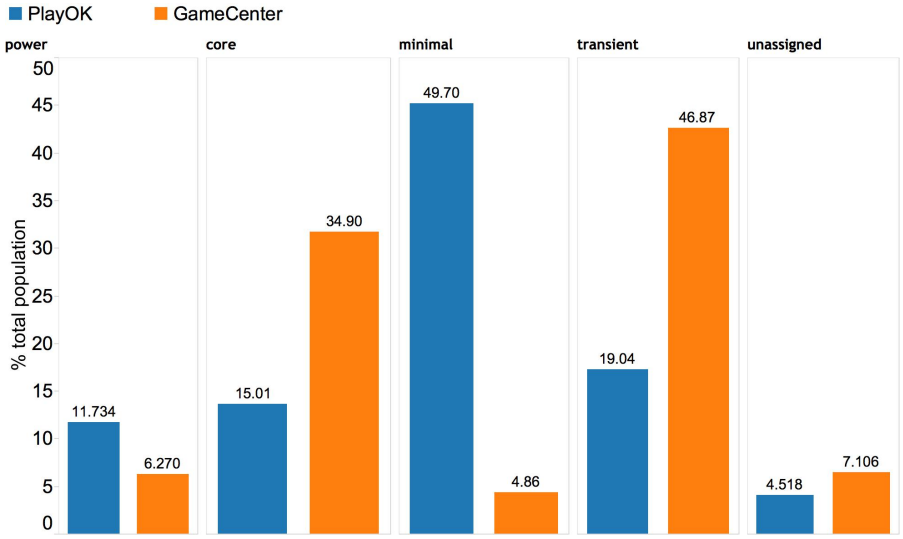


Figure 27: Players categorised by their level of use.

Perhaps the most interesting category is "minimal" as this shows a huge difference between the sites. The majority of PlayOK players fall into this category, perhaps reflecting the site's support for casual gaming – players can easily come and go for short periods of time and/or only occasionally. In contrast, GameCenter has very few players in this category. This may indicate that GameCenter is not so suited for casual play and players are less able to just "drop in" for a game every so often.

Social Interaction

How much do people play together?

GameCenter players play an average of 5.163 games with a median of 0, while PlayOK players play an average of 10.282 games with a median of 3. From these figures, it seems that PlayOK players play more games. However, when I compared the distributions of games played by charting gameplay counts versus percentage of player population between the two sites (Figure 28) the difference is localised at zero games – a large proportion of GameCenter players (nearly 50%) do not play any games, while only 11% of PlayOK players play no games – but for all other numbers of games there is a strong similarity between the two sites.

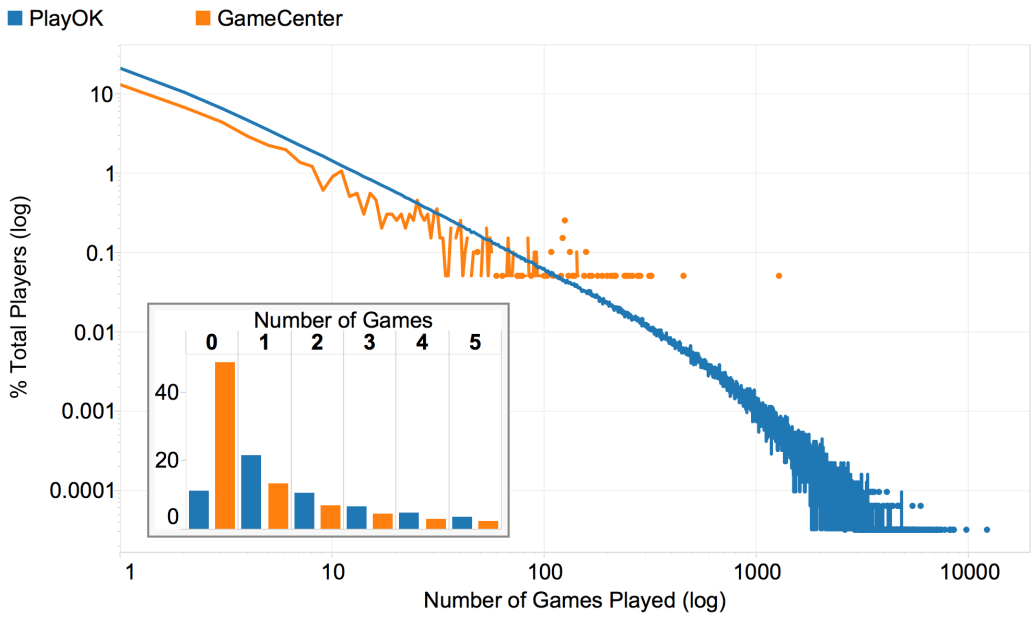


Figure 28: Number of games played by proportions of the player population in both PlayOK and GameCenter. The differences in the curves are only at the tail end and are due to the differences in size of the sites – i.e. a single player in GameCenter is about 0.1% while a single player in PlayOK is less than 0.0001%. The inset is a bar chart comparison of 0-5 games to show 0 games (not visible on the large chart due to the log scale) and to illustrate that there are no large differences hidden by the logarithmic scale (after 0 games).

Another difference is apparent in the Figure. In GameCenter there are no people playing large numbers of games. There are no GameCenter players in the bottom half of the chart because there are less players, but the reason that there are no GameCenter players on the right side of the chart is because they are not playing as many games. Many PlayOK players played over 5,000 games (and one enthusiastic player played over 10,000), but only one GameCenter player played more than 1,000.

These results only partially met Expectation 2, that GameCenter members would play fewer games. While the overall game playing averages are higher in PlayOK and there are PlayOK members that play many more games than GameCenter members, this is due to the difference at zero games – at other numbers of games, the two sites are very similar.

How much do people communicate verbally?

Over the three months of logging, each PlayOK player sent an average of 12.427 messages and the median was 3 messages. Each GameCenter player sent an average of 7.373 messages, and the median was 0 messages.

In Chapter 4, I measured the proportions of games with each count of chat messages. In Figure 29, I show how those proportions compare to GameCenter. While nearly 70% of PlayOK games had no chat messages at all, most GameCenter games had one, two, or three chat messages. My observations suggest that these messages mostly fall into two categories. The first is a "good game" or "gg" comment. The second is a request for a follow on game. In the cases where there is only one message, the other person may either have silently left the game or replied with the action of starting another game without a verbal reply.

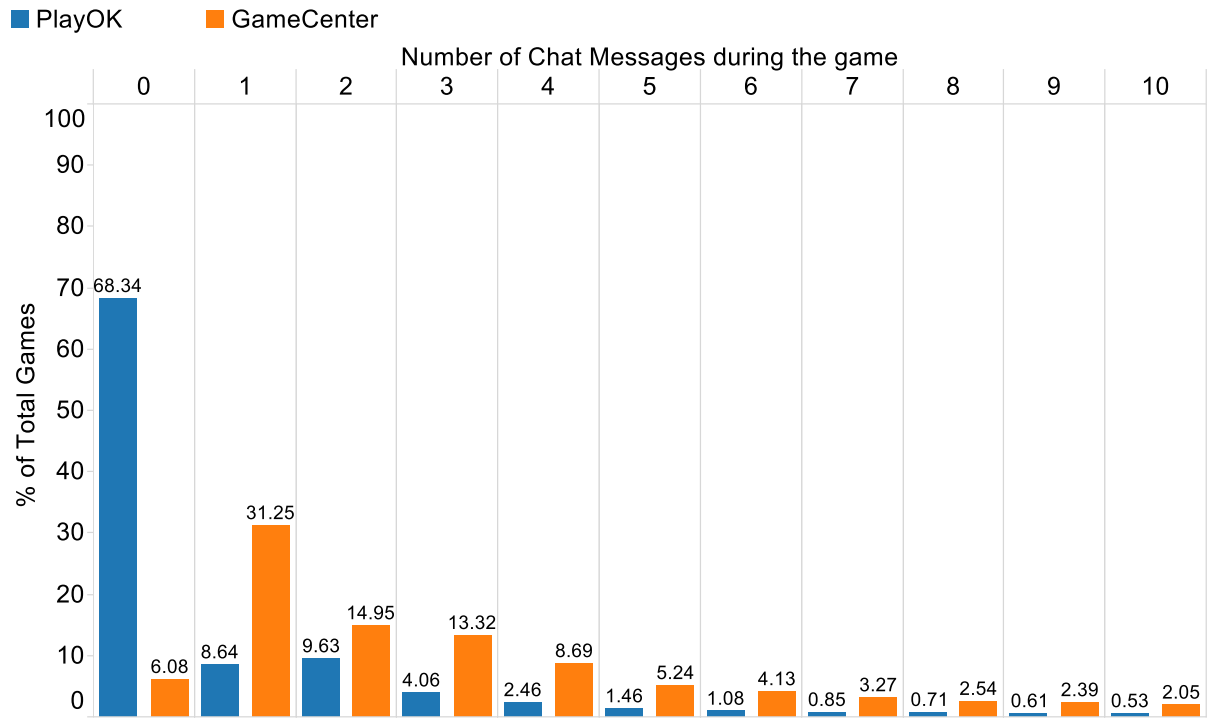


Figure 29: Histogram of number of chat messages per game.

The evidence contradicts Expectation 3. The overall averages show more chatting in PlayOK. Despite the wider distribution of verbal utterances for GameCenter in Figure 29 there are still very few messages in the majority of games. These few messages may play a social role but are not enough to be a conversation that would play the part of the primary social interaction.

Relationships

How do people find opponents?

There are four ways people can get together to start a game:

1. There is an established gaming relationship;
2. A conversation leads to a game;
3. One player invites another to a game;
4. A player creates a table and waits for opponents.

I classified every opponent pair; skipping the first two weeks, since category 1 relies on historical information (I used "opponent pairs" instead of games as a more fundamental unit for this analysis; a four person game has six pairs). The category definitions are summarised in Table 15. The thresholds were somewhat arbitrary but chosen to be favourable to the social categories based on game or chat interactions (1 and 2).

Table 15: Summary of game start categories. The definitions were applied in order, e.g. (1) history has precedence over (2) conversation.

Category	Definition
(1) History of gaming	The pair had played more than two games previously.
(2) Conversation	More than two messages were sent between the pair in the five minutes prior to the game start.
(3) Invitation	An Invitation was sent from one of the pair to the other in the five minutes prior to the game start. Note GameCenter does not have an invitation feature and so has no games starting this way.
(4) Waiting	All games not in another category.

Figure 30 shows the frequencies of the different starting conditions during the logging time for the two game sites. In both cases, the majority of games start with a player setting up a game table and waiting for opponents, suggesting that most games are spur of the moment. For the remaining games, the clear majority for PlayOK is an existing history, while GameCenter games are split almost evenly between history and conversation. There are more conversation started games in

GameCenter than can be accounted for by the missing invitation feature (assuming the same numbers as PlayOK), illustrating that GameCenter has slightly more explicit verbal communication.

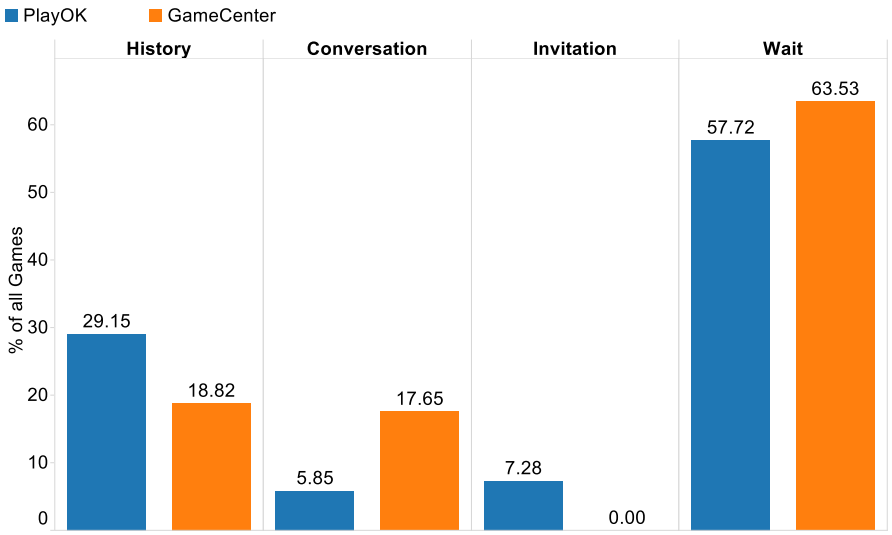


Figure 30: Proportions of game starting strategies. There is no invitation feature in GameCenter.

GameCenter's lower proportion of "History" games is counter to the expectation of stronger relationships. Specifically, Expectation 4, that GameCenter games will be started by shared history or conversation more often than PlayOK games, is contradicted. The higher proportion of games started by waiting also suggests less relationships.

Do people play (or talk) more with a small group?

On average, GameCenter players play almost forty percent of their games against the same opponent (Figure 31), showing that, for most players, there is a strong preference for their favourite opponent. However, after this initial preference, GameCenter opponent pairings follow a similar pattern to PlayOK and quickly drop off, showing that groups are small and most games are played with strangers. Like PlayOK, GameCenter players show a preference for sending chat messages to their top three favourite chat partners. GameCenter chat message pairings show an almost identical pattern to PlayOK chat partner preferences (Figure 32).

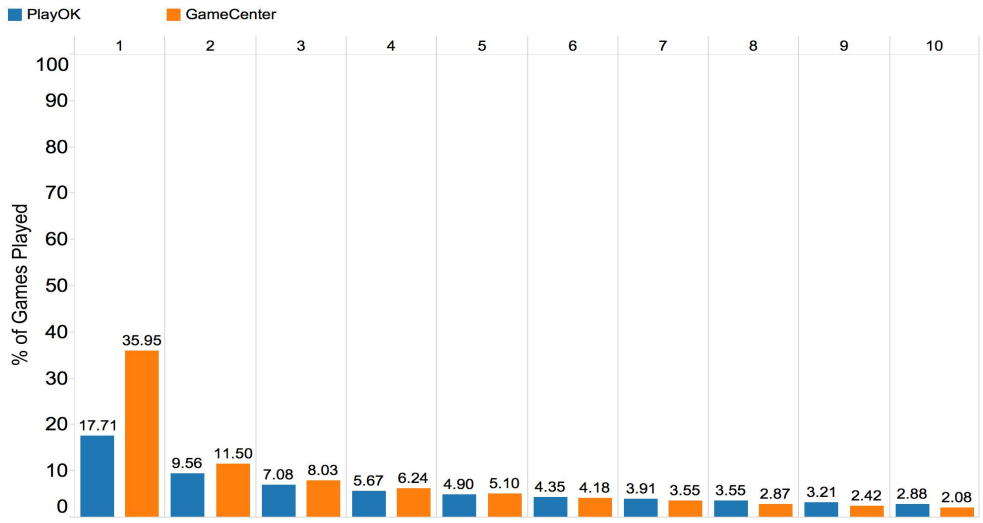


Figure 31: Average Proportions of games played with each player's top 10 favourite opponents. I counted all games played by each player on the site, categorising them by opponent. The opponent categories were sorted by number of games, and then converted to a percentage of all games played by the player. For example, if p1 played all their games against p2 then they would have 100% in column 1 and 0% in 2-10. I then averaged over all players to arrive at the figure. Only players that have played at least 10 games are included.

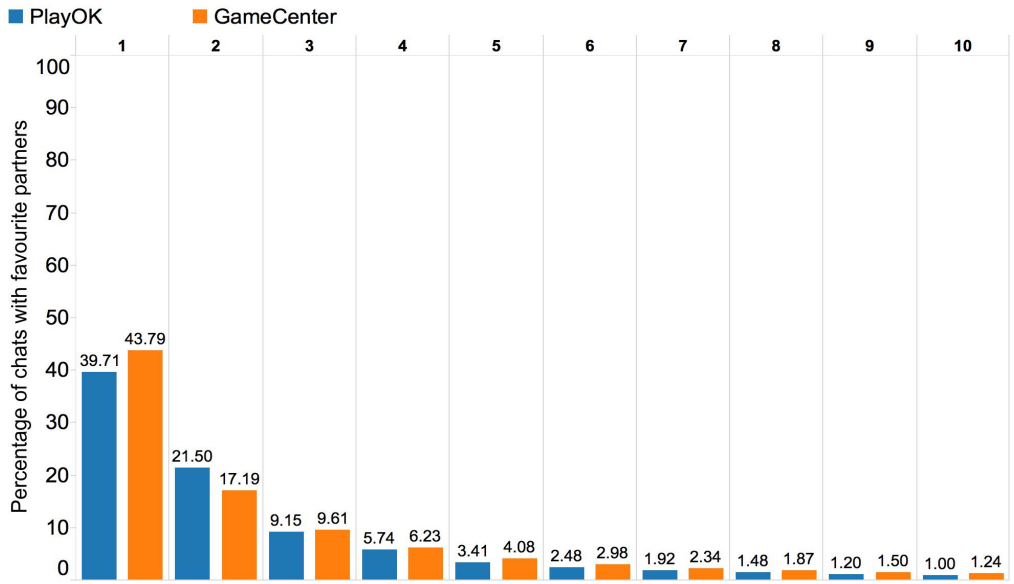


Figure 32: Average proportions of chat messages sent to each player's top 10 favourite chat partners. I counted all chats sent by each player on the site, categorising them by receiver. The receiver categories were sorted by number of chats sent, and then converted to a percentage of all chats sent by the player. For example, if p1 sent half their messages to p2 and half to p3 then they would have 50% in both columns 1 and 2, and 0% in 3-10. I then averaged over all players to arrive at the figure. Only players that have sent at least 10 messages are included.

As in the analysis of PlayOK, I counted occurrences of game partners playing "chains" of games, where, after finishing a game, they started a new one at the same table. Figure 33 shows the relative proportions of chain lengths. GameCenter encounters, even more so than PlayOK encounters, the majority are limited to a single game at a time.

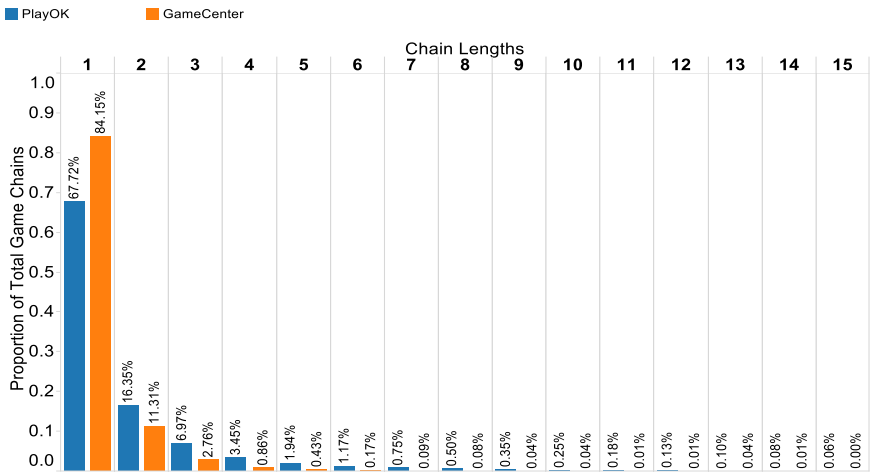


Figure 33: Proportions of games played in different length chains

I also compared how often opponent pairs repeated as a proportion of games played. Figure 34 shows that almost 60% of PlayOK games are between opponents that only ever play once. The same is true for just over 40% of GameCenter games. Presumably some of the difference can be attributed to the lower GameCenter population, which would lead to increased encounters with the same people. Both figures are high, reinforcing that on both sites, games are mostly with strangers.

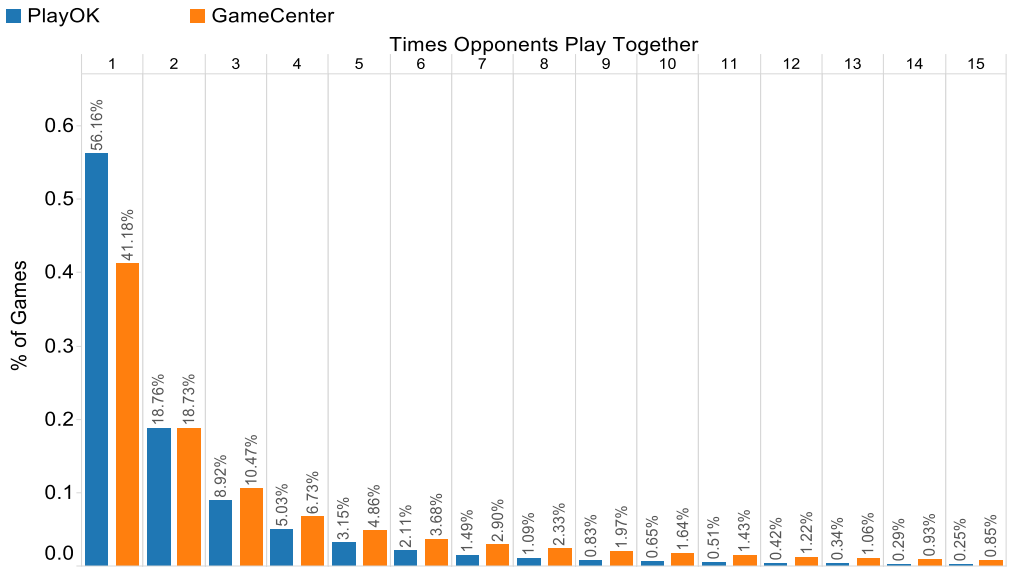


Figure 34: How often opponent pairs are repeated.

The data again contradicts my initial expectations. Expectation 5 states that GameCenter players will form more bonds than PlayOK players. It seems that this is only true for people playing games against their favourite opponent. For all other cases – chatting and playing against less favourite opponents – the behaviour in GameCenter is very similar to that in PlayOK.

Discussion

Before starting this comparison, I expected that GameCenter would more traditionally social than PlayOK, more precisely that GameCenter would show more member persistence, more verbal interaction, and more ties. My expectations were based on the large difference in population size between the two sites.

The impersonal interactions in PlayOK that I discussed in the previous chapter required a large population so that, regardless of when you enter the site, there is always someone around to play against. In contrast, GameCenter has a much lower population that PlayOK and has such a wide variety of games, so at any given time there is a strong likelihood of there being no other players who are interested in playing your game. At the same time, GameCenter has had an active community for over five years, so there must be something that is maintaining it. My speculation was that the GameCenter community was maintained by more traditionally social practices than PlayOK. However, a social metrics style analysis comparing the two communities does not support this theory.

Summary of Findings

Virtual Place: The design of both spaces is described in detail in Chapter 3. Both sites are designed primarily around playing games, with features such as chat and game move transcripts to support the games. GameCenter supports many more game types than PlayOK, including many niche or unique games, most notably the Sandbox, which supports experimenting with new game designs, and Toguz Kumulak, a game of central Asian origins that is not available elsewhere on the Internet.

People: The most notable difference in the members of the two sites is size of population. PlayOK had about 1,500 times more unique people than GameCenter during the logging period. Another difference is that GameCenter encourages two sub-communities. The first sub-community is made up of Toguz Kumalak (Toguz) players that are drawn to the site because Toguz is not available elsewhere on the web. The second sub-community is made up of people interested in game

design, and they are supported and encouraged by the Sandbox game, which allows experimentation with new game ideas, and by the administrator who sometimes implements newly designed games on the site.

Persistence: A much higher proportion of GameCenter players spend less than a day on the site, and for longer membership times, the two sites have very similar proportions of players. In terms of time spent during membership, GameCenter has higher proportions of people who participate very little ("transient") or participate regularly ("core"), while PlayOK has higher proportions who participate a little over a longer time ("minimal") and those who contribute most of the time on the site ("power"). These results contrast with my expectations as the higher transient and lower power proportions indicate less persistence in the GameCenter population. However, a much lower proportion of minimal players and higher core proportion suggest that there is something more complicated happening as well.

Social Interaction: There is a large proportion of GameCenter players that do not play any games, while in PlayOK the proportion is much smaller. Other than this difference, patterns of game playing are very similar in both sites. Chat patterns in games differ – while most games in PlayOK have no chat messages, GameCenter games usually have one to three messages. But, while the increase suggests a slight increase in social relations, it is not enough for a conversation and my casual observations suggest they are usually "good game" messages. These results run counter to my expectations. I expected more gameplay in PlayOK but the two sites are much the same. I expected more chat in GameCenter but PlayOK has higher averages, and while there are slightly more messages in game in GameCenter, the few messages exchanged are not enough for social conversation.

Forming Ties: On average, GameCenter members more frequently played games against their favourite opponent than PlayOK members did. Otherwise the measures of forming ties were very similar. Members of both sites played or chatted slightly more frequently with a small subgroup, but for the most part interacted with strangers. In both sites, the majority of games were single events with no follow-on game. This was counter to my expectation that GameCenter players would form more ties than PlayOK players. Other than the case of favourite game opponent, players on the two sites had very similar behaviour.

Comparing GameCenter and PlayOK Communities

Analysis of the two sites reveals a very different situation from my expectations. Where I expected that the smaller population of GameCenter would lead to a more traditionally social environment, the results show the sites are mostly similar. My expectations were based on the assumption that fewer people would lead to stronger ties, more verbal conversation, and more commitment. By this assumption, GameCenter has a better chance of being social than PlayOK as the larger population of PlayOK makes encounters with the same people less likely with a corresponding impact on formation of relationships.

The similarities in behaviour between GameCenter and PlayOK populations reinforce the conclusions of the previous chapter about BCG interactions. In that analysis, I concluded that most gameplay in PlayOK is based on impersonal interactions, where it does not matter *who* is around, just that *someone* is around to play against. In this chapter, the GameCenter population, despite having an environment more conducive to being traditionally social, displays mostly the same behaviour. This lends more weight to the conclusion that BCGs are generally based on impersonal interactions in general.

GameCenter also has the benefit of two strong sub-communities – the Toguz players and the game designers. These two groups may have helped to sustain the smaller community in three ways. First, they may have helped directly by attracting and providing interactions for those members interested in these activities. Second, just by being around and interacting with each other, they give a sense of community even to those not directly engaged (Blanchard & Markus, 2002). Third, in between engaging in their primary activities, they may interact with newcomers, for example by playing games that they only play occasionally. The sub-communities are likely to have been important to maintaining the site community over time, most especially as the site was growing.

In the previous chapter, I argued that, in PlayOK, game actions perform the same role that verbal utterances perform in a conversation – they are the basis of the social interaction. There is evidence that actions perform similar roles in GameCenter. Even though there is slightly more verbal interaction, it is still insufficient to be a conversation in the majority of cases. Therefore the game actions must play the majority part of the conversation. Playing online board and card games, whether in GameCenter or PlayOK, is about creating a shared experience. We can see in the interaction patterns explored here that, in this context, it is primarily the game actions rather than the verbal conversation that creates the experience.

The Strength of Large Numbers

While the results suggest that the two game site communities have the same principles underlying their behaviour, there are some interesting differences. GameCenter has a much higher proportion of people that do not play any games on the site, and also has a higher proportion of transient and core members but a much lower proportion of minimal members. These results suggest that the larger population of PlayOK make it more efficient at the impersonal interaction that appears to characterise BCG communities.

When a new person arrives at PlayOK seeking a game, the usual situation is that there are many potential opponents for each game type, and they will be able to play immediately as many times as they want. The fact that there are so many people all the time supports different types of engagement with the community – if a player wants to play a lot then they have many different opponents to choose from (power or core player); and if they want to be more casual and only visit the site every so often, there will be opponents when they require them (minimal player).

In contrast, when a new person arrives at GameCenter, very often there will be nobody interested in their particular game, and maybe nobody available for conversation. Therefore they may well leave without playing at all. For the same reason, the low population does not support visiting every so often to play. Those that do commit to the site are going to return often and have to spend some time to get the games that they want.

Conclusion

The purpose of this comparison is to move beyond the characterisation in Chapter 4 and be able to comment more widely on BCG sites. A comparison of two sites is not enough to make definitive statements about *all* BCG sites, but the addition of GameCenter provides a better insight into the issues that arose from the previous Chapter.

The evidence presented in this chapter supports the analysis in the previous chapter, that BCG community is primarily based in impersonal and anonymous interactions. GameCenter has more transient player numbers and less casual player numbers than PlayOK. It seems likely that this is because the smaller population means that it is less likely that there is always another person willing to play a game, especially of a particular game type.

CHAPTER 6
LEADERSHIP

In the previous two chapters, I looked at the behavioural foundations of BCG communities and examined how game sites can be successful even without typical hallmarks of community. In this chapter, I continue to explore behaviours of BCG communities by looking at leadership. Previous work tells us that leadership is an important success factor in virtual communities (Zhu et al., 2012), responsible for benefits such as increasing member satisfaction (Ho & Huang, 2009), being a "key component to survival and progress" (Williams et al., 2006), and encouraging group loyalty and cohesion (Yee, 2006). Leaders influence community members through high levels of activity and communication (Huffaker, 2010). Leadership activities are time sensitive – ongoing intervention is needed to resolve conflicts, encourage activity, facilitate social support, and fill other typical leader responsibilities – and previous research suggests that change to the leadership structure will have a large effect on the community within a short time.

However, there is little empirical research into how leadership change actually affects online game communities. Existing studies of leadership in virtual communities have assumed static leadership structures, e.g. (Huffaker, 2010; Jang & Ryu, 2009; Siitonen, 2009b), and I have been unable to find any work that analyses a community through a substantial change in leadership. In this chapter I investigate leadership in an online game community over a period of time where the leadership structure underwent a major change.

While collecting log data from the GameCenter site, the community founder, who was previously very active on the site, dramatically reduced his participation. Consequently my log data spans a substantial change in leadership activity. This provides an ideal opportunity to employ the social accounting techniques used in the previous chapters to compare GameCenter behaviour before and after the change to explore the role of leadership in this BCG community and find out what happens when it changes. While the situation provides an excellent opportunity to study the behavioural effects of a change in leadership, the type of data collected does not allow a deep study of how the community understands and relates to the change. In this chapter, I report on the aspects that can be determined from the log files.

I collected log data from GameCenter from the start of 2012 until August 2013. At the beginning of that time, the founder of the site was very active. Apart from being active, his role had further influence as the only formal leader on the site (Zhu et al., 2012) – as founder and maintainer of the site he had permissions and abilities to perform such activities as editing the site and blocking

people. However, in mid-2012 he substantially reduced his presence on the site to pursue other interests. I analysed the 16 months of log data I had collected – five months of active leadership, two months of transition, and nine months of reduced presence – to look for changes in the community's activity – for example, how much time people spent on the site, how many games they played, and the amount they talked with each other. In addition, I interviewed a small number of long-term members of the community to gain a deeper insight. To my knowledge, this is the first study to provide empirical data about the effects of changing leadership in BCG sites.

In my analysis, I divided the GameCenter community into three sub-communities. The first sub-community consists of 'Power players' (these are defined in the same way as Power players from the previous chapter) who play a wide range of games (selecting from over 140 types available on the site) and are enthusiastic about game design. The founder was heavily involved in discussing game design with this group and regularly implemented new games for the site, often based on their designs. The second sub-community are the 'Gamers' who also play a wide variety of games, but who primarily use the site to play rather than to design or discuss new games. The founder was active in this sub-community as well, but not to the same degree as with the power users. The third sub-community is brought together by the game Toguz Kumalak. The community is somewhat culturally distinct as most players chat in Russian. The founder (who also speaks Russian) had only a little involvement with this community.

The study in this chapter indicates that a community's resilience to leadership change is highly dependent on the criticality of the leader's role in the community's purpose. After the reduction in leadership, GameCenter appears to be evolving from a designer-oriented community to a general-gamer (including Toguz) site. These changes do appear to be related to the change in the founder's presence, but there has been no overall catastrophe for the site with reduced leadership. This chapter provides new understanding of the role and importance of leadership in online communities, and can provide designers with an empirical foundation as they seek to develop and support online groups.

Materials

GameCenter was founded by Arty Sandler (name used with permission) in June 2007 as a means for him to engage his interest in abstract game design. He was very active from the start, building up the site and community. In June of 2012, Arty let it be known that he was reducing his

commitment to GameCenter. However, there was no single announcement that reached everyone at once and the news spread slowly through the community over June and July.

GameCenter, including the interface and data logs, is described in Chapter 3. The data analysed in this study are from 1 January 2012 to 12 August 2013. This covers five months before Arty made his announcement, two months while the news spread, and just over nine months afterwards. To supplement the log data, I interviewed five experienced players and Arty himself. I also use data from the site news, which contained important events, such as adding new games. The news archives date back to the site's inception in June 2007. In addition, I also draw upon my own observations while chatting and playing on the site.

```
<log stamp="1334891701">
  <games>
    <game sid="game1" priv="0" title="Toguz Kumalak" status="FINISHED" startTime="1334295428"
          modTime="1334296451" uid="player1"  uid1="player1" uid2="player2" />
                                [637 other games]
  </games>
  <events>
    <event eid="10223810" stamp="1334286690" type="MSG" sid="game2" uid="player3"/>
    <event eid="10223811" stamp="1334286703" type="JOIN" sid="game3" uid="player4"/>
    <event eid="10223814" stamp="1334286739" type="LEAVE" sid="game4" uid="player4"/>
                                [~21K other events]
  </events>
  <chat>
    <msg stamp="1334318992" uid="player5"/>
                                [34 other chat messages]
  </chat>
  <userlog>
    <event stamp="1334287301" uid="player4" type="LOGOFF" />
    <event stamp="1334289872" uid="player6" type="LOGIN" />
    <event stamp="1334289948" uid="player7" type="ENTER" />
                                [1506 other user events]
  </userlog>
  <translation>
    <trans stamp="1334300449" numHit="1" lang="ru" />
                                [244 other translations]
  </translation>
  <users>
    <user uid="player8" regTime="1332485137" lang="ru" country="KZ" countryIP="KZ"
          sex="F" birthYear="1998" />
                                [321 other users]
  </users>
</log>
```

Figure 35: A partial sample of a GameCenter log file.

Log Files

I received the log files from the site administrator in the form of formatted XML text files. I created scripts using the Python[14] programming language to parse the text into SQLite[15] database files. I wrote additional Python code to use the SQLite data to calculate the social accounting metrics

[14] https://www.python.org/
[15] https://sqlite.org/

and write them to Comma Separated Value (csv) format. I then used Tableau™[16] visualisation tool to create charts from the csv files (e.g. Figure 37). The charts allowed me to visualise and explore the data.

Data from GameCenter came as structured XML (Figure 35). For this study I used logs from January 2012 to May 2013. Each file was a record of the previous week and was split into sections that recorded games (<games>), events that happened at game tables (<events>), chat messages in the public area (<chat>), user logins and logoffs (<userlog>), translations (<translation>; users can click a button on any chat message to translate it to their own language), and player profiles (<users>). In this example, player8 says she is female, has chosen her display language to be Russian, says she is from Kazakhstan (confirmed by her IP address), and says she was born in 1998.

Each event in the text log files contained user ID and time, as well as event specific information such as Country or Game Name (Table 16). It is important to note that, while log files record that chat messages were sent, there is no message content.

Table 16: Log event information.

Event	Content
User Record	User ID, Registration Time, Language, Country, Country by IP, Sex, Birth Year
Login	User ID
Logout	User ID
Room Chat	User ID
Active from idle	User ID
Game Chat	Game ID, User ID
Private Chat	-
Join Room	-
Leave Room	-
Join Table	User ID, Game ID
Leave Table	User ID, Game ID
Invite	-
Game Start	-
Player clicks Start	User ID, Game ID
Player changes Game Options	User ID, Game ID
Game End	Game ID, Privacy Status, Game Name, Player IDs, Start Time

[16] http://www.tableausoftware.com/

I first parsed the raw log text and put the information into a structured database format. I created database tables that gathered information about the player, game, and chat entities, and I created links between these tables to allow queries about such things as how many chat messages a player had sent, or how many games they had played. I also did more complex processing of the logs to elicit time-dependent relationships, such as tracking which players were at a game table to determine who would receive a chat message sent to that table at a specific time.

Interviews

I interviewed five members of the GameCenter population who were all experienced users and who were on the site regularly before, during, and after Arty made his announcement. I also interviewed Arty to gather his impressions of his own role and how it had changed. Interviews were via email, text chat, or video chat and were unstructured, as I was interested in high level impressions and wanted the freedom to follow up on interesting answers. Due to the small number of interviewees, I do not rely on these interviews for conclusions but only for understanding and examples.

Methods

I use the logs to generate social accounting metrics to compare GameCenter community behaviour before, during, and after Arty's leadership change. Social accounting metrics are well suited to this exploratory study because the metrics serve to give a general sense of social patterns, rather than detailed views of small differences.

In my analysis I identified three sub-communities in the GameCenter population: Toguz Kumalak (Toguz) players; Power players, who I identify as mostly game designers; and Gamers, who play other games. I discounted those who had played less than five games from this classification because they had not participated sufficiently.

I defined Toguz players as those whose most-played game type was Toguz. Toguz is popular through central Asian countries such as Kazakhstan and Kyrgyzstan and GameCenter provides the only real-time online implementation of Toguz. Toguz players usually chat in Russian using the Cyrillic alphabet, whereas players of other games most often converse in English. Though GameCenter provides a translate feature for chat messages, this still creates a cultural division. Measuring by number of players and number of games played, Toguz is the most popular game on GameCenter.

Power players spend the most time on the site. Roughly based on the Pareto principle or 80/20 rule, I define them as the smallest group that accounts for 80% of the total logged in time. I assume that the power group contains many members interested in game design. While I cannot verify this with the data, as usernames are anonymised and chat content removed, I have strong reasons to believe this is the case. First, Arty's primary reason for creating the site was game design, and formal leaders strongly influence the culture of a community (Mamykina et al., 2011; Williams et al., 2006). Second, my experiences on GameCenter were that game designers were the most vocal and most frequently online.

People in the Gamer sub-community were not motivated by game design but came to the site to play the many game types available. This group includes all players who are not Power or Toguz players.

The groups were classified in the order above, which makes a difference as many Toguz players could otherwise qualify as Power players. With this sub-community classification, there are 1,266 Toguz players, 68 Power players, and 806 Gamers. These numbers are over the entire logging period. During that time there is a great deal of turnover in the population so there are far less in any given week.

I generated social metrics of three types of activity from the logs for the analyses in this chapter. GameCenter members can engage in three fundamental types of activity – they can spend time on the site, play games, and send chat messages. I expect that Arty's perception of his own activity is accurate and there was a significant reduction in his activity in all three areas. From the community, I expect that the Power players will reduce their activity, but Toguz and Gamer activity will remain much the same. Power players have a high level of interaction with Arty, mostly in discussing and creating games, and are likely to have their experience of the site adversely impacted by him not being there. In contrast, Toguz players and Gamers are there for the games and, as found in the previous two chapters, that appears to be sufficient for sustaining a community without a formal leadership structure.

I also extend these basic metrics of activity, with the interviews and my own observations for support, to infer leadership behaviours based on the discussion of online community leadership in section 2.2.4. In that section I described how leadership includes task-based leadership and person-based leadership. Team leadership behaviours can be divided into task-based and person-based (Burke et al., 2006; Pearce & Sims, 2002; Zhu et al., 2012). Task based leadership behaviours guide members' activities and can be further divided into transactional, aversive, and directive. Person

based leadership behaviours build social structure and encourage personal development of members and can be divided into transformational, consideration, empowerment, and motivation.

My ability to analyse leadership behaviours from log files alone is extremely limited and the investigation here only scratches the surface. However, I am able to measure various social accounting metrics that are likely linked to leadership aspects. Below I go through each of the leadership behaviours, give a brief reminder of their definitions, and describe how that type of leadership behaviour appears in GameCenter. I describe the measurements of these behaviours that are available in the log files, and my expectations for how they could change over the reduction in Arty's activities.

Task-Based: Transactional

Transactional leadership rewards members based on the desirability of their actions. In GameCenter, four activities result in transactional rewards: certified registration; donations; translation; and designing games.

When members first register they have an option for quick registration with just username and password. Certified registration with a validated email address can be done at any time and certified members are given a "Certified Member" badge on their profiles (Figure 36, bottom). While non-certified members are not restricted in terms of functionality, the FAQ warns *"there are people who will reject playing with non-certified members"*.

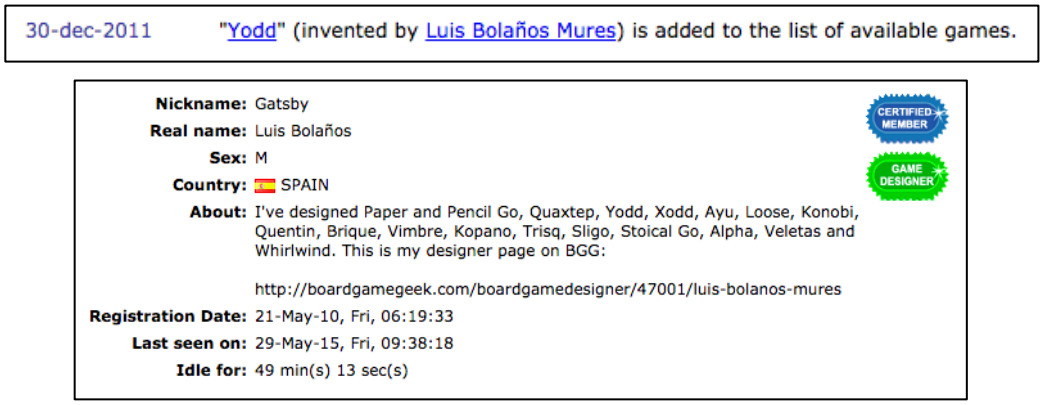


Figure 36: Entry on the news page (top) and the profile page for one of the members (bottom). The news entry announces that a new game has been added to the site. The game's designer is a GameCenter member, so his name is a link to his profile (bottom). The profile shows information that the member has agreed to share publicly and also shows "Certified Member" and "Game Designer" badges. (Used with permission from Luis Mures)

Members are also able to donate money to help with maintenance and running of the site. Donations of over $10 are rewarded with a "Donator" badge on the member's profile (not shown).

Every page can be displayed in one of multiple languages. The translations are provided by GameCenter members, though Arty did the initial English and Russian pages. There is a web interface for creating a translation that can be reached using a "Translate This Page" link on each page. The link leads to a form where the member specifies a target language and edits a translation. Full translations are a lot of work as each game has a separate page for rules. Translators are rewarded with a thank you in the site news (not shown). There have been 12 full translations and over 20 partial translations.

Many regular members are, like Arty, interested in game design, frequently discussing the design of games. Some also design games. Arty regularly added new games; including those designed by GameCenter members. Those who had their games added were mentioned on the news page and given a "Game Designer" profile badge (Figure 36).

Given that there is a dedicated game design sub-community and that new games are the most visible of these rewards, addition of newly designed games would be the primary transactional leadership activity on the site.

I measure transactional leadership activity by the rate of games being added to the site. I gather this information by going through the news pages on the site and recording all the new game notices. I also recorded whether GameCenter members designed them.

I expect that, as Arty's activity decreases, the rate of games being added will also decrease. It may even stop all together, because implementing new games and adding them to the site is labour intensive and time consuming.

I also expect that reducing work on new games will most severely affect people that are there for game design, but will not have much impact on those who are there for other reasons. There are already a large number of game types to support gamers looking for esoteric games, including Toguz Kumulak, the most popular game on GameCenter.

Task-Based: Aversive

Aversive leadership relies on coercive behaviour, using intimidation and reprimands to discourage undesirable behaviour. I am limited in what I can discover about aversive leadership in GameCenter because the log files do not contain chat message content. However, the interviews provide some examples, though there is no quantitative analysis available.

Task-Based: Directive

Directive leadership concerns giving clear direction to members about their responsibilities. I found no examples of directive leadership in GameCenter, either in the interviews or from my own observations.

One possible task that contained a type of directive leadership was in the translations. When translating a page on the site, the translator would be given clear directions about phrases to translate. However, translation is not useful for this analysis for two reasons. First, the process is largely automated, with little intervention from Arty and so is not a good reflection of his leadership. Second, most translations wanted by the community had been done by the time Arty reduced his activity, so there was little to no activity by that time anyway.

Person-Based: Transformational

Transformational leadership develops members' personal capabilities so that they can contribute better. Due to the voluntary nature of virtual community membership, the most important transformational leadership activities are building membership (transforming non-members into new members) (Koh et al., 2007) and transforming new members into regular members (Koh & Kim, 2003).

Measuring this behaviour directly is again difficult because of the lack of message content. I also have no information about activities offsite that may result in new members. However, by counting chat messages from Arty and "older" members to newer members, I will gain some insight into the encouragement of new members.

I expect that Arty's messages to newcomers will decrease as his activity decreases. At the same time, I expect that the number of messages from older members to newcomers will increase to fill the gap, as this is a leadership task that is easily shared by community members. If these expectations turn out to be true, the total amount of newcomer encouragement will remain roughly constant.

Person-Based: Empowerment

Empowerment leadership activities encourage members to build their own abilities and become self-reliant. The effects of empowerment can be seen when members start to take on responsibilities performed by formal leaders (Pearce & Sims, 2002; Zhu et al., 2012).

As noted above, I expect that older members of GameCenter will take over the responsibilities of encouraging newcomers to the site.

Person-Based: Consideration

Consideration leadership contributes to building and maintaining intra-group relationships. In GameCenter, relationships are expressed through playing games and sending messages.

Arty is likely to encourage new and existing relationships simply through his presence and activity. The log files do not give any direct information about how he creates this effect, but by measuring the number of games and messages between members, both overall and between new pairs, I can see the indirect effects.

I expect that, as Arty's activity decreases, the relationships between site members, as measured by their game and chat activity, will also decrease. This will include decreases in new relationships between people that have not interacted before, and decreases in established relationships.

Person-Based: Motivation

Motivation leadership behaviours encourage members to exert effort, especially during hard times. During the change in leadership in GameCenter, the most relevant result of motivational leadership is the resilience of the community after Arty's reduction in activity.

As with many other leadership activities, the log files give no information about the leadership task directly. However, by comparing the activity of the community and its sub-communities before and after, I will gain some insight into the effects of motivational leadership. As stated above, I expect that Power player activity will decrease, while Toguz and Gamer activity will remain much the same.

Results

I have structured this section to explore the aspects of leadership behaviour and their effects in GameCenter. The section is split into two subsections: in the first, I explore Arty's leadership behaviour and how it has changed; and in the second, I explore how Arty's change in activity has affected the rest of the community.

I looked at the logs before, during, and after Arty's withdrawal. As news of Arty's decision spread mostly by word of mouth, there was no single announcement that reached everyone, but,

according to reports from Arty and interviews, the news reached most people through June and July 2012. Consequently all charts are split into three periods: *Before* (1-Jan-2012 – 31-May-2012); *During* (1-Jun-2012 – 31-Jul-2012) (light grey on the charts); and *After* (1-Aug-2012 – 12-Aug-2013). All chart data points are sums for a period of a week. I chose one week as this is a common cycle of activity for most people, including work and leisure activities.

Arty did make one change after his withdrawal, to add a separate Toguz page on 19-Nov-2012. This was by request of non-Toguz players because they felt that the Toguz activity was overwhelming their community. The communities are not completely separated as they still share public chat and online list. However, the Toguz page only shows lists of current and old Toguz games, while the main page does not show Toguz games. I have marked all the time based charts with a line labelled "TK Page" to indicate when the separate TK page was implemented.

Leadership in GameCenter

In this subsection I explore Arty's leadership behaviour in GameCenter. I start by exploring the extent of Arty's reduction of the basic types of GameCenter activity – being online, playing games, and sending chat messages. I then investigate the person- and task-based leadership activities listed above.

In general, the log files do not provide direct information about Arty's leadership activities. Specifically, I was unable to gain information about Arty's activities for directive, empowering, consideration, and motivational leadership. For the most part; I assume that the reduction in simple presence, gaming, and chatting activity shown above corresponds to a reduction in leadership activity.

However, there are some leadership activities that can be discovered from the log files, and others where there is anecdotal evidence from the interviews. Below I describe Arty's leadership as gleaned from these sources.

Arty's Activity

The user IDs in the log files were anonymised, but Arty informed me which ID belonged to him, which enabled me to isolate his activity data.

Arty maintains contact with the site community. In fact, as seen in Figure 37, the time he spends logged in each week has not decreased substantially. A two-sample unequal variance t-test between before and after shows a significant decrease ($p<0.01$) from an average of 37.3 hours/week ($s=13.8$) to an average of 22.8 hours/week ($s=7.1$). While the difference is significant, Arty is still spending a lot of time on the site. However, this metric may contain an anomaly because when asked about this result, he explained that GameCenter is on his browser home page and automatically logs him in whenever his browser is open.

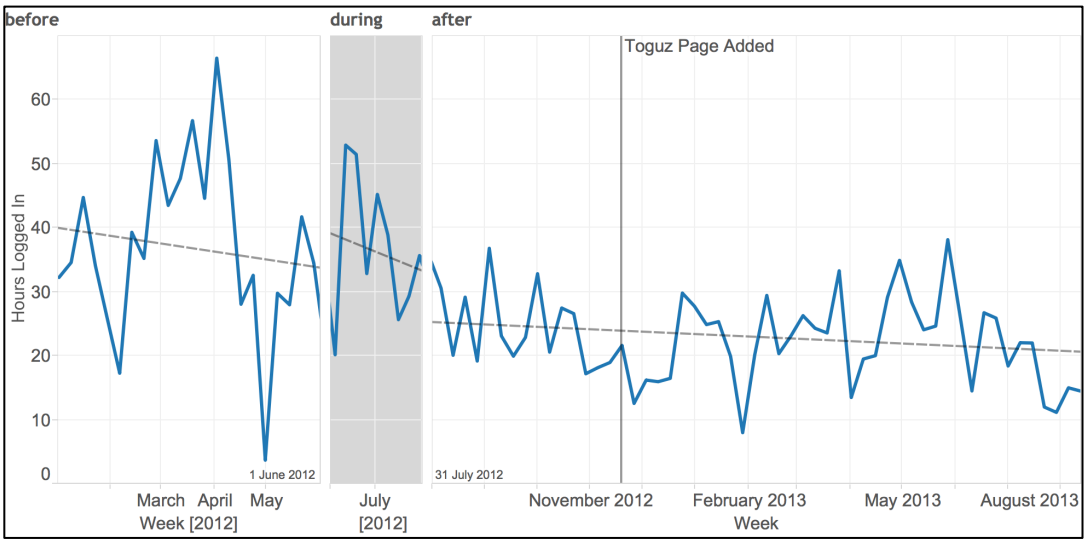


Figure 37: Arty's time spent logged in each week. Each data point is total number of hours spent logged in over a week.

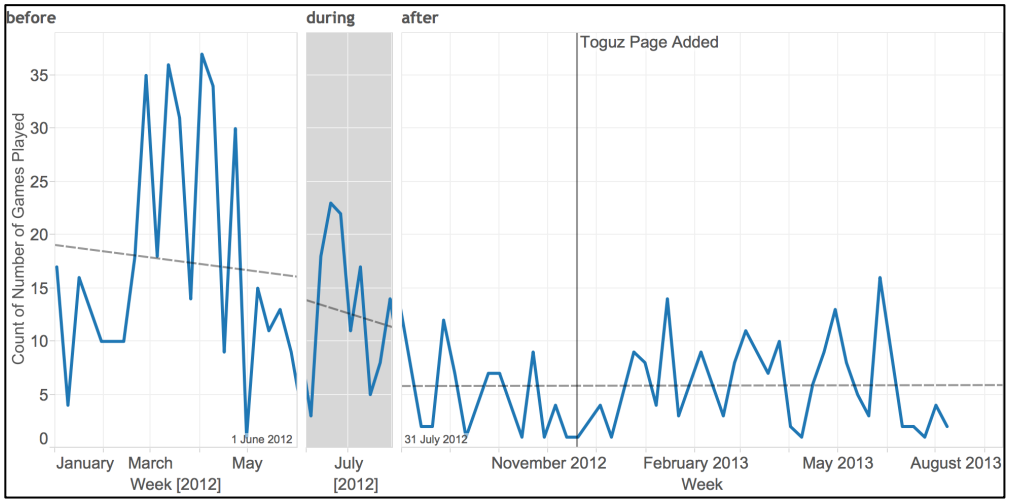


Figure 38: Games played by Arty each week.

Arty's game count is a better indicator of his level of activity than login time as games require explicit action. Figure 38 confirms that his weekly gaming activity is substantially reduced in the *After* period, confirmed by a t-test ($p<0.01$) as decreasing from an average of 17.5 games/week ($s=11.4$) to 5.2 games/week ($s=4.2$).

Chat message counts are also a good indicator of activity, as much of his interaction is answering questions, resolving disputes, and socialising. Figure 39 shows that his chat activity dropped substantially between before and after. The decrease is significant ($p<0.01$) from an average of 299.7 messages/week ($s=197.3$) to 100.2 ($s=133.9$). There are also some spikes in chat levels during the time he was leaving; one possible reason for these is that they are from discussions of his decision with the community.

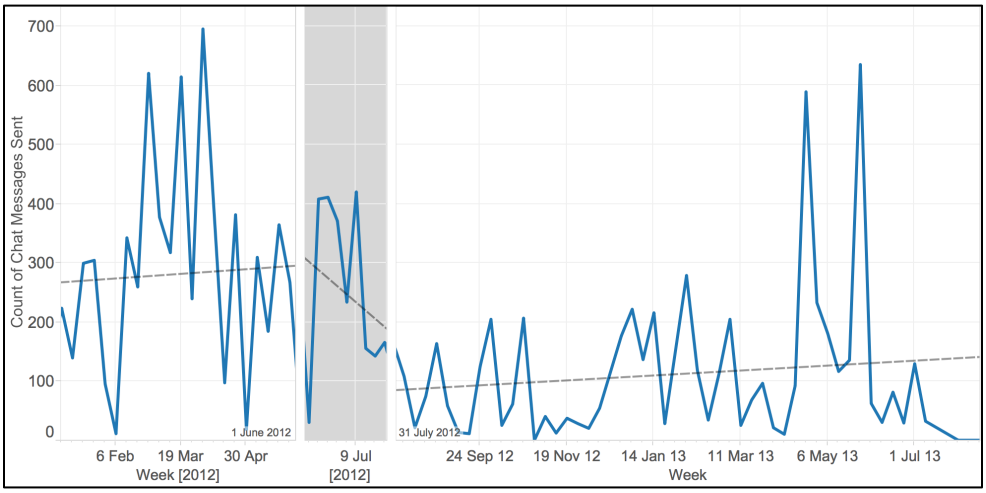


Figure 39: Chat messages sent by Arty each week.

The charts confirm Arty's report of his own activity. He has reduced his login time, gaming, and chat interaction. The differences are summarised in Table 17. The table only shows the differences in averages and the variation is large in each case, so it is important to also refer to the charts.

Table 17: Percent change in Arty's average activity between the before and after periods.

Login Time	Games	Chat Messages
-38.8%	-70.4%	66.6%

Arty's Leadership: Transactional

Before he reduced his activity on the site, Arty frequently added new games – usually at least two or three each month – and many of them were member designed (Figure 40). It seems likely that he sometimes added games partly for recruitment, as some people joined GameCenter just after the addition of games that they designed. After withdrawing from the site however, he added no more games.

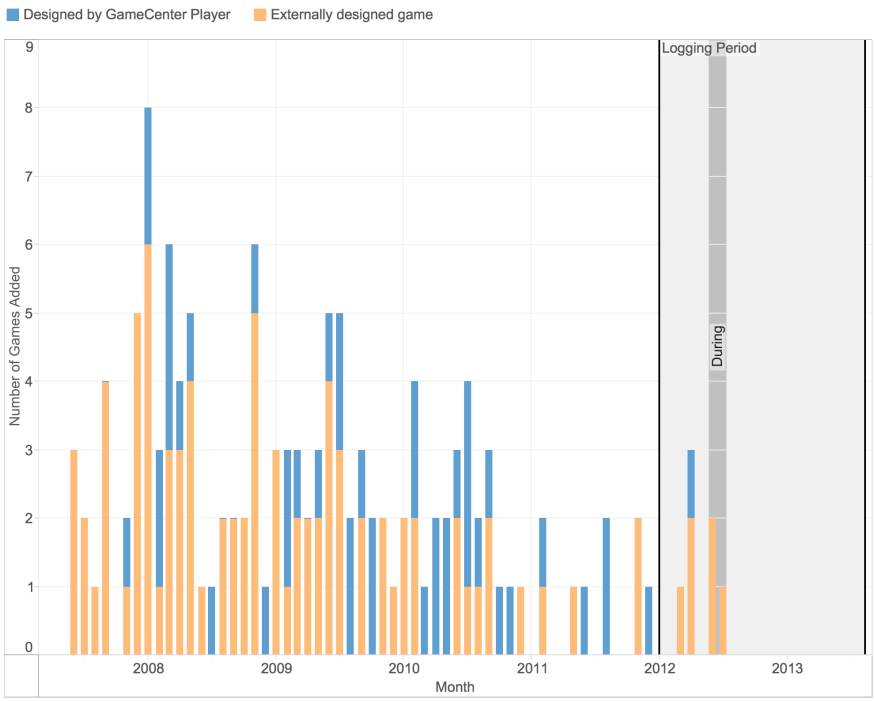


Figure 40: Number of games added to GameCenter each month from the site's creation until end of logs.

The following quotes provide insight into how important adding member designed games was to the community:

> *Arty was putting a lot of good energy in the community … He also would have a good contact with some game designers, implemented a lot of games for them. That created good relations on the site … I guess everybody liked and respected Arty. [P3]*
> *I will always be grateful to Arty for the server itself, and the fact that he implemented my game, and also listened to my critical input about how to implement Hex and Twixt. [P5]*

This transactional leadership behaviour has disappeared completely (Figure 40 shows the last game added was in July 2012) as Arty has stopped adding games. One interviewee gave his view of how the community had changed:

> *The biggest impact on the community seems to have led to people looking to [member]'s opinion on games driving the discussion of game designers, rather than our own level of excitement and/or Arty's level of enthusiasm towards the new game (and the likelihood of being implemented) [P1]*

These results met my expectations exactly. I expected that Arty's reduced activity would result in games no longer being added to the site.

Arty's Leadership: Aversive

I am limited in what I can discover about aversive leadership in GameCenter because the log files do not contain chat message content. However, the interviews provide some examples, showing that Arty does do at least some policing and that his authority as founder was important:

> *Of course sometimes he also had to correct people's behavior. There was an accident with some "spammers" as far as I remember. [P3]*
> *There are a few people who will try to mediate in disputes, but they don't have the authority Arty does. [P2]*

However, at least some people feel that the issue could partially be dealt with through shared leadership:

… we are sorta split as a community on the issue, I say just don't play with players you don't like (self policing), others want Arty to take action. I don't think arty trusts anyone else to handle official complaints. [P1]

One of the interviewees felt that Arty's contribution to maintaining the peace, however subtle, was critical to the continued survival of the community.

The number of games and most of the other people are pretty cool, and I think the site would only need a little tending to continue [but] I think <member> will ruin the place. I think he should have been banned permanently already … It's just that I've seen these sorts of toxic people ruin game communities before. They're usually the last to leave. [P2]

These anecdotes only demonstrate that Arty has engaged in aversive leadership behaviours. I have no quantitative evidence to show how often he did so, either before or after his withdrawal from the site. That he reduced his chat messages would suggest that this kind of behaviour also decreased.

Arty's Leadership: Transformational

Arty also has a role in *transformational leadership*, which is best expressed through interaction with newcomers to the site. By chatting to newcomers he seeks to transform them into continuing members. Figure 41 shows Arty's chats with newcomers over time. For this analysis, I define newcomers as people that have registered within two days of the chat message. Only game table chat messages are counted, as it is impossible to know the intended receivers of public broadcast messages.

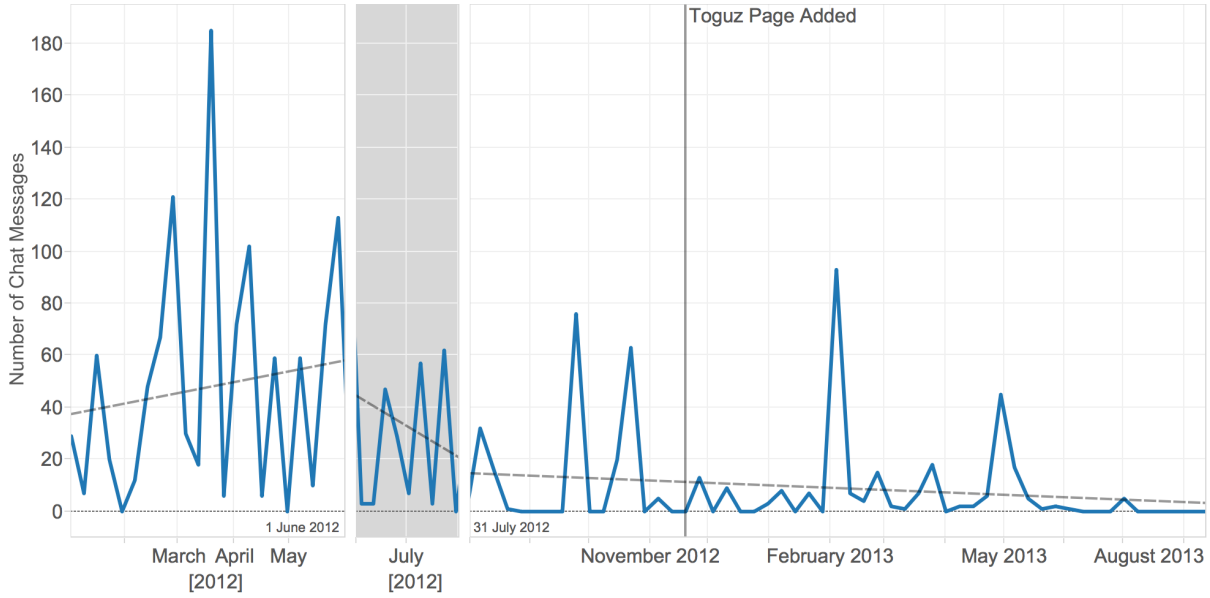


Figure 41: Arty's chat messages to newcomers.

The interviewees (including Arty himself) were clear that Arty went out of his way to welcome people to the site, e.g.:

> *Whenever [Arty] saw a new player he would enter the game and have a little chat with him/her. It was encouraging. [P3]*

The log data of chat messages to newcomers from Arty (Figure 41) picture of encouraging behaviour in GameCenter. The chart shows that there is a decreased level of interaction with new players from Arty, confirmed by a two-sample unequal variance t-test ($p<0.01$). Before his reduction in activity he sent an average of 48.0 messages/week to newcomers ($s=42.0$) while after he sent an average of 8.8 messages/week ($s=18.6$).

This data meets my expectations. Arty's messages to newcomers decreased as his overall chat messages decreased.

Effects on the Community

The next step was to analyse the effects of the change in Arty's leadership on the rest of the community. First I measured fundamental activity patterns – login time, games played, and chat messages sent. I then measure the effects of leadership activities, some directly, but mostly indirectly from behaviour and interview anecdotes. The log files reveal no information about Directive task-based leadership, or about Consideration person-based leadership so I leave these out of the results presented here. The response of the rest of the community around Arty's withdrawal provides insight into the types of roles he played and their importance within the community.

Community Activity

In Figure 42 I plot the total hours of logged in time each week of each of the three sub-communities. A visual inspection shows a marked rise in Toguz hours, and suggests Power and Gamer hours have decreased. Two-sample unequal variance t-tests confirm the visual inspection. The Toguz group shows a significant rise ($p<0.01$) from an average of 1017.7 hours per week ($s=252.8$) before to 1492.5 hours/week ($s=367.5$) after. The Power group time online decreased significantly ($p<0.01$) from an average of 846.0 hours per week ($s=229.9$) before to 586.7 hours/week ($s=124.6$) after. The Gamer group also significantly ($p<0.01$) decreased their time online from an average of 409.5 hours per week ($s=146.4$) before to 236.5 hours/week ($s=74.0$) after.

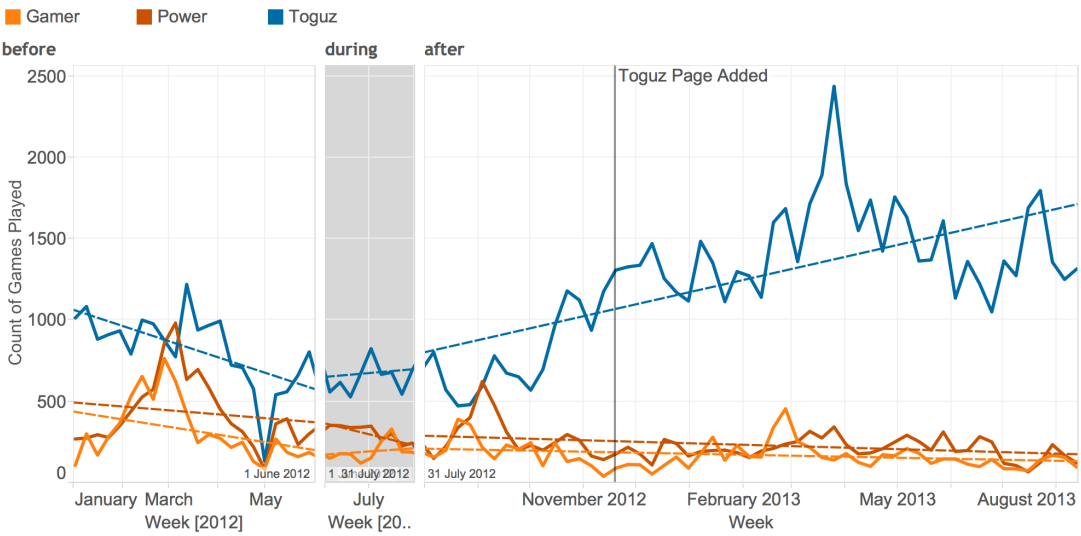


Figure 42: Hours online each week.

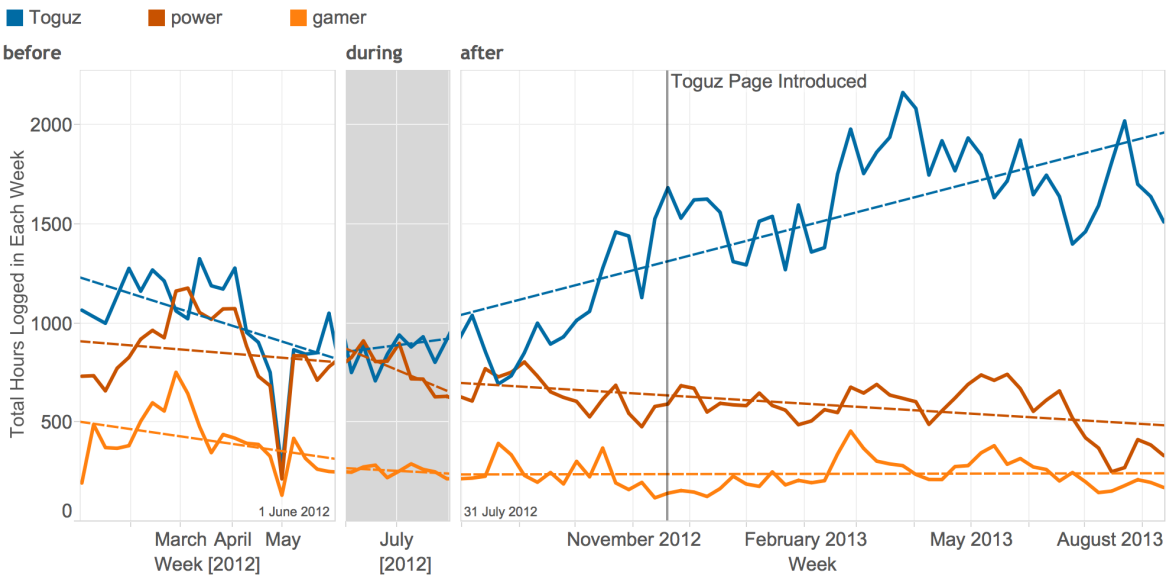


Figure 43: Games played each week.

There are very similar results looking at the number of games played (Figure 43). Visual inspection of the chart shows a marked increase in Toguz games, and a slight decrease in Power and Gamer games. The t-tests comparing before and after periods all agree with the visual inspection. Toguz games per week increased significantly ($p<0.01$) from an average of 817.0 ($s=245.1$) to 1248.3 ($s=401.8$). Power group games per week decreased significantly ($p<0.01$) from an average of 429.6 ($s=220.7$) to 229.0 ($s=92.2$). The Gamer group played significantly fewer games per week ($p<0.01$) from an average of 317.0 ($s=190.8$) to 168.2 ($s=82.2$).

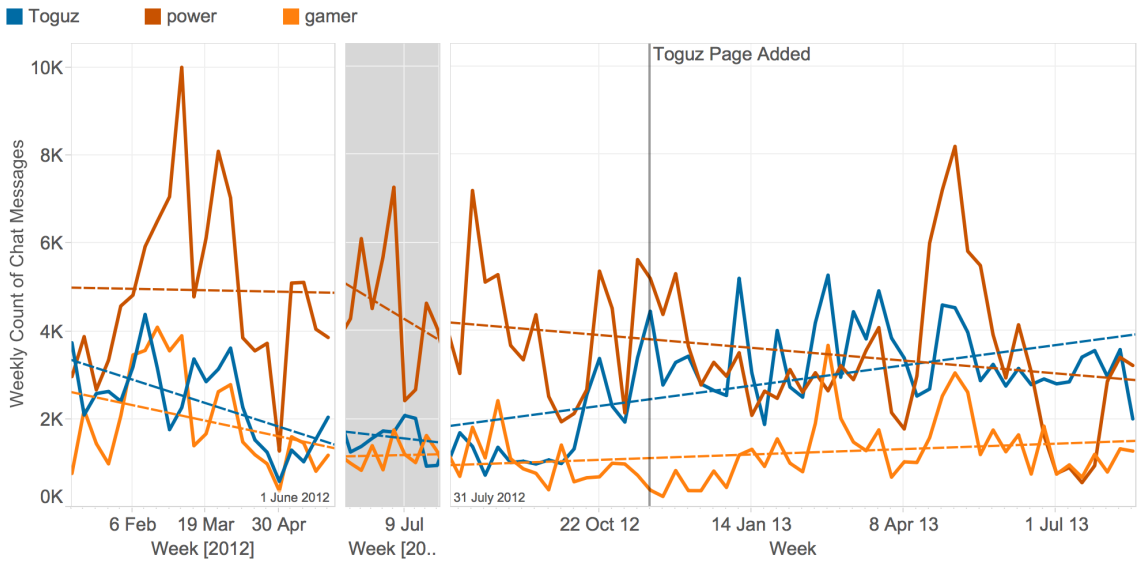


Figure 44: In-game chat messages sent each week.

Figure 44 shows counts of in-game chat messages for the three groups. The differences between before and after are less than the differences in login times and number of games. A visual inspection suggests that Toguz is again increasing, Gamers are decreasing, and the Power group is sending about the same number of chat messages. The t-test comparisons are unable to confirm a significant change in Toguz chat messages. t-tests show a significant decrease ($p<0.01$) in both the Power (before Av=4895.9, s=2005.6, after Av=3497.3, s=1681.5) and Gamer (before Av=1975.1, s=1120.9, after Av=1202.8, s=738.0).

The charts show an increase in Toguz game and login activity starting mid-October 2012. This predates the creation of the new Toguz page by about five weeks, suggesting that the page itself had little impact. I have been unable to discover what prompted the growth – though one interviewee thought the Toguz sub-community was filling the gap left by the Power community. The new page does not appear to have resuscitated the Power sub-community as hoped by those who advocated it.

In all cases except Toguz chat, there were significant differences between the before and after periods. Toguz activity increased, while the activity in other sub-communities decreased.

Table 18 summarises the differences in averages, though, as the variations were so high, it is still important to refer to the charts.

Table 18: Differences in average activity for each sub-community.

	Login Time	Games	Chat Messages
Toguz	46.7%	52.8%	n.s.
Power	-30.7%	-46.7%	-28.6%
Gamer	-42.2%	-47.1%	-39.1%

Leadership Outcomes: Transactional

The main component of Arty's transactional leadership was adding new games to the site. After this stopped, I expected that activity amongst game designers would decrease and activity for others would remain around the same. As expected, Power user (my stand-in for game designers in this study) activity decreased.

However, activity in the other two groups had a more complex response. I expected that the other two sub-communities would be unaffected, but Toguz activity increased and Gamer activity decreased. While it may seem unlikely that transactional leadership changes are causes for either of these changes, it is not impossible.

Leadership Outcomes: Transformational and Empowerment

I have grouped Transformational and Empowerment leadership activities together because I measure them with the same metric – chat messages to newcomers. I have already established that Arty's chat messages to newcomers decreased significantly. In this section I explore the rest of the community's patterns of chat to newcomers.

Figure 45 shows the numbers of chat messages to newcomers from "older" members of the 3 sub-communities. Older members are defined as those that registered at least a week before they sent the message. There are a large number of chat messages to newcomers, suggesting that the transformational leadership activity of welcoming newcomers may be seen as a shared responsibility in the community. This would demonstrate some empowerment of the community as they take on leadership roles available to them.

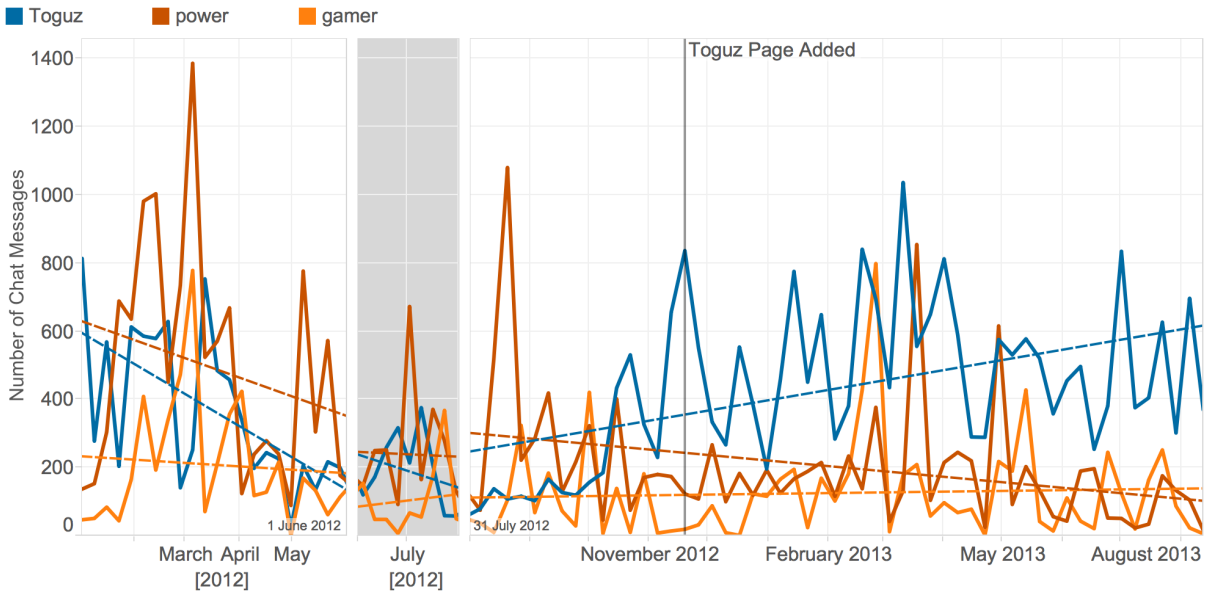


Figure 45: Chat messages to Newcomers from older players other than Arty

The only sub-community that showed a significant change in average messages to newcomers from older players, was the power group. Before Arty reduced his activity they sent an average of 500.9 messages/week (s=351.2) and after they sent an average of 187.8 messages/week (s=144.7). Including all members of the sub-communities (not just the older members) gives the same result. Including all oldtimers and Arty shows no significant difference.

My expectation was that the number of chat messages would expand to replace missing activity from Arty. The results here do no show any significant change in message numbers from

Toguz and Gamers, and a decrease in messages from Power players. However, while Arty was very active for a single person, the overall message numbers to newcomers shows no significant change.

Leadership Outcomes: Consideration

I measure Consideration leadership by its impact on relationships between players. There are two types of relationships – game playing and chatting. For chat relationships, I only consider in-game chats because it is impossible to judge the intended recipient of public chats without the message content. I also consider whether a new relationship is being established or an established relationship is being revisited. New relationships are defined as those in which the two people have never gamed or chatted before. Old relationships are those in which the people have either chatted twice before or played with each other twice before.

In Table 19 I show comparisons of before and after proportions of chats and games that are part of new and old relationships. These figures are proportions rather than raw numbers to account for the changes in activity in the sub-communities. Where there are significant differences I have tagged the direction of the change in average proportion.

Table 19: Comparison of before and after proportions of messages and games that are between new and old pairs of people. Comparisons use two-sample, unequal variance t-tests and all reported results are significant with $p<.05$. Results are written average (std dev), before above after.

		Toguz	Power	Gamer
Chat	**New**	n.s.	↓ .012 (.005) .006 (.003)	n.s.
	Old	n.s.	↑ .967 (.014) .983 (.009)	n.s.
Game	**New**	↓ .203 (.028) .187 (.024)	↓ .107 (.028) .059 (.026)	n.s.
	Old	↑ .494 (.065) .539 (.051)	↑ .719 (.073) .842 (.064)	n.s.

In the Power sub-community, the proportion of chats and games in new relationships has decreased, while the proportion of chats and games in old relationships has increased. Similarly in the Toguz community, the proportion of games in new relationships has decreased and the proportion of games in old relationships has increased.

These results partially matched my expectations. I expected that new relationships would decrease and that was true for Toguz games and Power games and chats. In contrast with my expectations however, I was unable to detect any change in Toguz chats or Gamer activity, and old Power relationships and Toguz game relationships actually increased.

Leadership Outcomes: Motivation

In discussions with Arty he made it apparent that making the GameCenter community self-sustaining was an important goal to him. However, it was one he struggled with, and, while he had made advances, he felt that the community was still more dependent on him than he ideally wanted.

At the time of his withdrawal, Arty was still a gatekeeper to certain leadership behaviours. This is made clear in the previously seen charts and statistical analyses showing the community activity (Figure 42, Figure 43, Figure 44). In addition, the comments in leadership sections above suggest that Arty's authority was still an important influence in the community.

Discussion

The study provides five main results:

1. Arty was very active as a formal leader. Then his activity – including login time, game playing, and chatting – substantially reduced. This matched expectations.
2. Arty is still present on the site and still performs some leadership jobs, e.g. resolving disputes. The only function that has disappeared completely is implementing new games – a key component of transactional leadership and one of the core functions of the site. This also matched expectations.
3. The Power and Gamer community activity – login time, games played, and chats sent – significantly decreased. Toguz login time and game activity significantly increased. While I expected the Power decrease, I was surprised by the Toguz increase and Gamer decrease.
4. Arty's transformational leadership – in the form of chatting with newcomers – decreased on the site. Messages to newcomers from older Power players also decreased but there were no significant changes either from other sub-communities or overall. As expected the community maintained the level of support to newcomers but contrary to expectations, this did not include any significant increase in messaging from any sub-community.

5 The Toguz sub-community showed an increase in the proportion of games with established relationships and a decrease in new relationship games. Power player new relationship chats and games decreased, while established relationship chats and game proportions increased. In the Gamer sub-community, the proportions of new and old relationships for both chats and games remained about the same.

In the next sections I discuss the implications of these results and how they can be applied to design.

How Important is Formal Leadership?

When I started this analysis, I expected one of two scenarios. The first was that Arty's leadership would be important to the community, as found in much previous literature (e.g. (Koh & Kim, 2003; Williams et al., 2006)), but only really critical to certain parts of it. The result would be a general decrease in activity that might still be in progress, though I expected that some parts of the community that were less reliant on Arty might be less affected. The second was that the community was self-sustaining, in a similar fashion to those in other game sites (like PlayOK, discussed in Chapters 3, 4, and 5), and there would be no impact. Instead, I discovered complex effects that varied by sub-community.

Power players showed a decrease in all types of activity, both in the overall community and in the statistical analysis of individuals that were present before and after. I surmise this is mostly in response to the transactional leadership behaviours that disappeared entirely when Arty withdrew, as the loss of game implementation would have impacted game designers the most. Arty was also an active member of this community, and so his reduction in other activity may have also been a factor.

The analysis of consideration leadership showed that this sub-community was proportionally increasing interactions in old relationships and decreasing new relationships. Given the overall reduction in activity, it seems that the sub-community is becoming more insular as it decreases in size and influence.

I was surprised by the decreases in activity in the Gamer community. I surmise that participation as a Gamer relied heavily on encouragement from other players. When Arty reduced his activity, the direct outcome was that he reduced his encouragement, but there was also the follow-on effects of the reduction of Power player activity, including reducing their transformational leadership (messaging newcomers) and establishing new game and chat relationships. In

GameCenter, the lower population means that there is less ability to support new people through the impersonal interactions of PlayOK. I was unable to detect any change in the proportions of new and old relationships in this sub-community, which may be a hopeful sign that indicates it is finding a self-sustaining operation without Arty and the Power players.

The Toguz sub-community's increase in most forms of activity was surprising. One possibility is that this sub-community has found ways of providing necessary leadership support in ways that did not become evident in my analysis. They are not dependent on Arty for adding games, and he has little to do with interacting with the members. I speculate that they are similar to the communities reported in Chapter 4 that are motivated and sustained by interest in games.

The contrast between the different sub-communities is heightened by the fact that Arty was not only leader, but also founder. His reasons for founding the site were to pursue personal interests in discussing and building new games, implying a high level of passion in his involvement in the site. The founder role and his passionate involvement would have given his leadership a weight not available to a non-founding leader. This likely magnified the impact of his reduction in activity.

PlayOK has no strong visible leadership , suggesting that there may be alternate models of successful communities than have typically been studied in research literature. Longer-term studies of online groups through leadership changes provide insight into the role of community.

Leader's Perspective

Up to this point I have been considering events from the perspective of the community. While this is the main focus of interest, as most readers are interested in how to build communities, it is also worth considering the perspective of the leader. Arty withdrew from the site to pursue other interests. However, the site is of considerable value to him personally as he had invested a lot of time and effort into building it up over five years. He withdrew but did not disappear completely and our interviews indicated that he was still important to the community.

Hence, while his presence is reduced and he is not in the same role as before, he is not simply another player on the site. He has deliberately changed his interactions and responsibilities – nevertheless, his mere presence as an important figure may play a part in the continued success of the GameCenter community.

Implications for the Design of Online Communities

As others have found (e.g. (Ginsburg & Weisband, 2002b; Koh & Kim, 2003; Williams et al., 2006; Zhu et al., 2012)), leadership is important to building and maintaining a community. I emphasise this point as the results show that loss of leadership roles can have a strong impact on community activity. These jobs must be filled in the community, either by a single person, small group, or large team of people. Roles can be formal or informal, explicit or implicit.

An important lesson that reinforces lessons from previous work (e.g. (Pearce & Sims, 2002; Zhu et al., 2012)), is the value of distributing leadership tasks. Consider the tasks of 'welcoming newcomers' and 'implementing new games'. The first was shared and so Arty's withdrawal had little impact (at least directly, there were follow-on effects). In contrast, the second can only be performed by Arty, so there was a strong negative effect on the community. The lesson is to spread responsibilities around and avoid a single point of failure.

Results from the Toguz community provide evidence that communities can be sustained by an activity focus. This study adds to the discussion and evidence in Chapters 3 and 4. The gaming activity provides an incentive and excuse for interaction as well as a means for interaction.

An important lesson here is that leaders do not disappear. Community leader is a difficult and time-consuming job (Ducheneaut, Yee, et al., 2007); leaders have invested themselves in the task. When retiring, they often do not want to cut all ties to the community, yet being a standard member is often not appropriate. Ideally, leaders require a graceful and voluntary abdication path.

Conclusion

Leadership is considered a critical element in online communities, as it provides members with a stronger sense of community and plays a strong role in shaping the community culture. However, there is a lack of empirical analysis of communities that have undergone a substantial change in leadership. In this chapter, I have begun to gather and assess that empirical evidence.

The main contribution of this chapter is to show that the influence of leadership is not uniform. Subgroups in the community were influenced differently according to their reliance on the activities of the leader, and to the degree to which leadership activities could be distributed to other members of the community. In some cases, subgroups showed strong resiliency in the face of the loss of leadership. This research helps designers to understand the complexities of leadership in online communities, providing an important foundation for developing and supporting online group.

CHAPTER 7
DISCUSSION

In the introduction chapter I identified the problem that I would address in this dissertation - that designers and researchers have a poor understanding of the characteristics of BCG communities, and how those characteristics are affected by factors that are typically seen as important for community such as size and leadership. So far I have described studies into different components of community in online board games; each of which has been an initial exploration of an aspect of BCG community.

The purpose of this chapter is to relate the study results to each other and to the original problem statement. As part of this task, I also discuss how this work might impact understanding other BCGs and other multiplayer games in general. I also offer some guidelines to aid in management and design of communities.

Understanding BCG Communities

The problem statement above reflects the three topics that have been explored in this thesis. I first characterised the dominant behaviour in a successful BCG community (Chapter 4). Then I compared different sized BCG communities (Chapter 5). Finally I explored the behavioural effects of leadership change in a BCG community (Chapter 6).

In Chapter 4 I found that the large, active, and long-lived PlayOK community was mostly (though not exclusively) supported by large numbers of anonymous and impersonal action-based interactions. The community is sustained, not by talk between friends, but rather by members simply requiring someone to play against, without caring about the identity of that opponent. Interactions are generally not verbal, and instead are based on the game itself. That a community can be sustained by informal interactions of this type is a new finding, and it is important that these interactions are primarily action-based.

In Chapter 5, I explored the effects of size by comparing PlayOK and GameCenter, and found many similarities. Even with a much smaller population and more incentive to be traditionally social, GameCenter community behaviour was very similar to PlayOK and again featured mostly anonymous and impersonal action-based interactions. The primary effect of the smaller size was not to create a more traditional social community as expected, but simply to make it less efficient at always providing an opponent. This chapter also provided evidence that informal action-based

interaction was more widespread than just the PlayOK site, and gave some insight into the influence community size.

However, Chapter 6 complicated the picture of GameCenter being similar to PlayOK, by showing a different leadership structure. This study demonstrated that at least parts of the community were not only based on impersonal and anonymous interactions but were also dependent on particular individuals – in this case the formal leader of the site. The results of the chapter also showed that sub-communities (i.e. Gamers) could be dependent on other sub-communities (i.e. Power players) and suffer follow-on effects based on those dependencies.

The results of these three studies suggest that BCG communities largely operate differently than the kinds of communities that have been previously studied. BCGs are unlike social media sites, online discussion forums, or chat servers because they do not have much verbal communication, strong personal relationships, or much persistence of members whereas in more traditional communities these behaviours are critical to the success of the group. However, while BCG communities are different from other communities, the lessons about informal interaction, action as social interaction, and leadership can be extended to other situations. Researchers investigating online communities can expand the set of considered community types, and that designers of online community sites should include these findings when considering what types of interaction to support and encourage.

Extending the Principles Towards a Framework

In this thesis I investigated three topics in the contexts of BCG site communities: Informal Interaction, Action as Social Interaction, and Leadership. Each of these topics identifies a dimension that varies in different communities, .These dimensions start to form a framework for communities based on the findings of this dissertation. Other dimensions are useful for describing communities as well though, including synchrony of interactions, place-based vs people-based, physical or virtual or a mixture, and many others, though I will not discuss those here. Below I discuss the dimensions that are identified by the topics, and then how they might be applied to a number of example communities.

Informal Interaction

Informal Interaction is perhaps easier to consider as a point on a continuum of social engagement. A high degree of social engagement would correspond to being very socially present

and recognised, and a low degree would be the informal interaction seen in this dissertation. A community with only a high social engagement would include properties such as strong boundaries, all members being highly visible, strong expectations of involvement, and strong identity (real or pseudonymous). Examples include competition sports teams, some MMOG guilds (Williams et al., 2006), and the core members of an open-source software group. Low social engagement communities are like PlayOK and GameCenter, with predominantly informal interaction. There are many sites that support a range of engagements, such as the Internet Chess Club and Twitter, both of which are discussed in more detail below.

One question that arises in communities with low social engagement levels is why people use them at all. Given that all they want is to play the game and seemingly not engage in any social interaction, it seems that a single-user game program installed on their home computer would do the job much better. A local program would have advantages such as a better and more customisable interface, no potentially unreliable internet connections, and no cheating by opponents (e.g. using AIs to look up moves, disconnecting when they are losing, etc.).

A hybrid of playing at home and playing online is to play against an Artificial Intelligence (AI) agent on the site. As an illustrative example, GameCenter does have an AI agent, called "igBot" to clearly signal its role (bot, short for robot, is another term for AI agent). There is only one but it can play an effectively unlimited number of simultaneous games. The AI agent is able to play most of the game types available on the site. When a player opens a new game table, if no opponent has joined within a few seconds, it will enter the table and give clear instructions about how to use a text command to ask it to join the game and be an opponent. However, anecdotally, igBot has little activity and does not stop GameCenter from having low population problems.

The implication of both the popularity of the BCG sites and the low use of bots, is that people prefer interacting with other people, even if there is nothing inherently person-specific about the interaction. This is a rich topic for further research. An investigation that could be done now is to use the collected data logs to explore who uses igBot and how they use it. Good starting points for finding out more about motivations would be interviews with GameCenter users that focus on igBot and wider interviews with anyone who plays on BCG sites about when they use a BCG site or an AI.

Action as Social Interaction

Communities are also defined by how much they support verbal and action-based modes of interaction. Primarily verbal communities include online forums such as the BAP mothers support group from (Ellonen et al., 2007) (discussed in more detail below), some more social MMOG guilds, and older text based chat such as Internet Relay Chat (IRC). Predominantly action-based communities are primarily interested in the activity and include PlayOK, some pickup sports, gay bathhouses (Bérubé, 2003), and games such as Words With Friends. Communities with a more balanced focus are much more common and include Facebook, Twitter, social walking/running groups, and most MMOG guilds.

Leadership

There is always leadership of some kind, though it is not always prominent. For example, the PlayOK administrator is not visible on the site most of the time but he would intervene if there were a violation of the rules. Leadership can be defined in terms of visibility or interventionism. Leadership can be formal, with appointed roles, or informal, where it is emergent from the social structure. Leadership with low visibility means that there is little visible guidance on activities. Examples include PlayOK and Facebook. In communities with highly visible leadership there are active leaders encouraging and directing behaviour and people. They don't necessarily engage with the whole community but there are definite sub-communities of followers. Examples include the Internet Chess Club, Twitter (informal leadership from celebrities), and neighbourhood organisations.

Examples

In this subsection I discuss a number of example communities, both virtual and physical. I use the framework dimensions described above to drive the discussion of each. The examples here do not provide complete coverage of the framework, but serve to raise a number of interesting topics and demonstrate how the framework is applicable when discussing communities.

Internet Chess Club.

The Internet Chess Club (ICC) (Ginsburg & Weisband, 2002b) is a commercial BCG site that offers online chess playing. It also supports some chess variants and, secondarily, some other game types such as Scrabble and Poker. Like PlayOK and GameCenter, players start in a room with

other online players and games in progress listed. Games are conducted in separate virtual table spaces, where players are able to watch or play. Unlike PlayOK and GameCenter, ICC is supported financially by member subscriptions. I have included ICC as an example because it is another BCG but can be seen to contrast in the leadership aspect.

ICC supports a range of interaction engagement levels. People can play anonymously as guests, though their interactions are limited severely, for example they are not allowed to chat. People can sign up for an account with an initial free trial period. Once paying the monthly subscription, members have an official ranking, which immediately communicates status. There are also officially ranked Masters and Grandmasters on the site. There are a number of site roles, such as helpers and managers, for those that want to be part of the community leadership structure. The benefit of all these roles is to allow people to enter the community at a low level of engagement and transition smoothly to the level that they are comfortable at. This serves to support and retain a larger number of players, and because informal interaction is always supported, the majority who just want to play the game are able to do so without having the overhead of social engagement.

The purpose of the site is to support chess playing, so, as with any BCG site, the purpose is highly action-based. While I have no collected data for the site, my guess would be that the primary activity is playing and not talking. The investigations that I have done in this thesis lead me to speculate that the defining behaviour in all three sites is anonymous and impersonal action-based interactions. For most people, the fundamental purpose of BCG sites is to play games. I believe that the primary determinant of success is whether people coming to the site are able to play, and so there is a great emphasis on opponents being available.

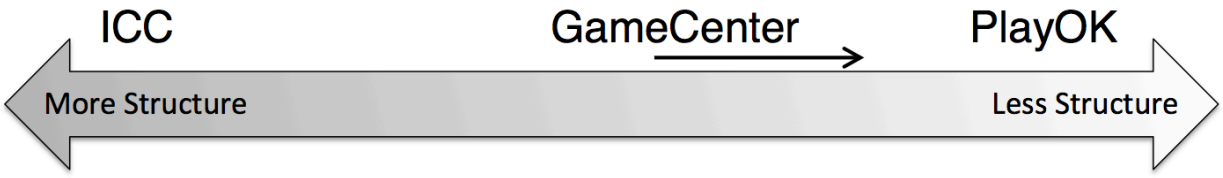


Figure 46: Social structure scale showing relative locations of the three BCGs ICC, GameCenter, and PlayOK. GameCenter would have been moved to the right by Arty's reduction in activity.

ICC relies on a large number of volunteers to populate a hierarchical, multi-role formal leadership structure. Each role has well-defined tasks and privileges to support the community. The three BCG sites – PlayOK, GameCenter, and the ICC – can be placed on a scale of leadership

structure (Figure 46). On one end, PlayOK has little formal leadership structure, ICC is on the opposite end with its formal social structure, and GameCenter exists in between.

However, ICC differs in its use of formal leadership roles. There are implicit roles such as titled players, e.g. Grandmasters, who are courted with free accounts and capabilities for charging for exhibition matches or teaching. The reputation and services provided by these players help to attract new members. The explicit leaders are: Helpers, that help members and actively seek out newcomers to introduce them to the community; Administrators that train helpers and manage disputes; and Managers that organise tournaments on the site when there is sufficient demand. In the leadership terminology introduced in Chapter 2 and explored in Chapter 5 titled players provide transformational and motivational leadership; Helpers provide transformational and consideration leadership; Administrators provide empowerment, aversive, and directive leadership; and Managers provide motivational leadership.

Leadership structure – whether formal or shared – adds to the more traditionally social aspects of the community. As discussed in Chapter 6, leadership can encourage newcomers, build relationships, and motivate member persistence, amongst other benefits. Because of these influences, I suspect that BCG sites with stronger leadership structures will show larger proportions of traditionally social community characteristics. These characteristics would include such activities as verbal conversations and stronger social bonds through games and chats with the same partners.

GameCenter, as with all BCG sites, was largely based on impersonal and anonymous interactions. However, like ICC and due to the leadership structure, it displayed some behaviours like a more traditional community; that is, parts of the site community were more invested in relationships and discussion. These traditionally social sections of the community suffered more from the reduction in leadership than the "just play" sections. The latter seemed more affected by the number of people available. On the scale in Figure 46, GameCenter moved closer to PlayOK in response to Arty's reduction in activity (shown by the arrow), as the event had a large impact on the GameCenter community (Ch6), showing a high dependence on a single formal leader. Arty's change in activity would have reduced the structure and would have moved GameCenter closer to PlayOK on the scale.

ICC provides an example of how multiple formal leadership roles can be integrated into a virtual community. As a BCG, it is likely to be similar to PlayOK and GameCenter in many other ways, so it is well suited as a contrasting example to show how this one aspect can be varied.

Theatres

Theatres are physical-world communities that contrast with the other communities discussed so far by being place-based rather than people-based. A theatre will have events performed by a group of performers, such as an acting troupe or an orchestra (I am using "theatre" broadly) that will be viewed by an audience. The performers may be associated with the theatre or only there for a single performance. The audience will change radically from one performance to the next (especially for repeat performances). The success of the theatre is not about particular groups of people, either performers or audience, but about whether the audience is large enough over time. I have included theatres as an example because they are physical communities with an extreme example of a transitory community.

A typical audience is made up of many small groups that do not know each other. Thus there is a mixture of intimate interactions between friends, and informal interactions between those that are only related by being at the same event, probably only once. These two elements – no requirement for integration with existing social structures and easy importing of existing relationships – make it easy to join a theatre audience crowd.

The theatre audience is potentially very transient. The success of the theatre is not bound to particular people and as long as there are enough people attending any given performance, the theatre is successful. This is analogous to GameCenter and PlayOK, where I found a large proportion of transient players. However, the theatre is an even more extreme example of transitory members as both PlayOK and GameCenter had some stability of membership. There are also examples of online communities with this extreme level of transitory population, for example, in the Scrabble™-like game Words With Friends[17] players usually let the system randomly select an opponent. There are video-chat applications that will connect random partners together, e.g. Chatroulette[18] and Omegle[19], for participants to have conversations with strangers with no opportunity to maintain or re-establish connections. An example from Human Computer Interaction research is the ESP game (von Ahn & Dabbish, 2004), which randomly partners people to tag images on the Web. In all these settings, the concept of community is challenged even more than by PlayOK and GameCenter. On these sites players are even less concerned with the identity of their partner, but only that they need or want others to complete the activity. In a game setting

[17] https://en.wikipedia.org/wiki/Words_with_friends
[18] https://en.wikipedia.org/wiki/Chatroulette
[19] https://en.wikipedia.org/wiki/Omegle

the player needs an opponent and in the theatre it would be uncomfortable to be the only person in the audience. If the goal of the community member is to have someone else present, without the identity of the other being important, it seems like such these extreme examples still need to be considered when considering community.

Theatre audience interaction is highly action-based. People are there to see the performance and in most theatre-like places, there are strong cultural norms against talking during the performance. Viewing the performance together is a shared experience and probably provides some social connection between audience members. It seems like the connection would be weak though and not very persistent. Perhaps if audience members were to see each other over many performances, the relationship could strengthen.

Leadership in theatres is usually not explicitly visible most of the time. However, behaviour is highly regulated. Seats are often assigned, audience members are directed when to enter and leave the performance, times for making noise (e.g. talking and clapping) are specified, and so on. The benefit of this kind of arrangement is that the performance is predictable and every member of the audience is able to enjoy the performance without others adding to it. In contrast, at a sporting event there is no expectation of silence during the performance and the audience noise is part of the experience.

The Theatre example shows a physical world community where success and longevity are not based on any particular individuals. Like PlayOK and GameCenter, and communities like them, there can be a high proportion of transient members. As long as there are sufficient people the community is sustained, and it does not matter whether those people are new or have been many times before

Neighbourhoods

Neighbourhoods, like Theatres, are physical, place-based communities. However they contrast with Theatres in that the population is much more stable. Even the most transient people in a neighbourhood stay for at least multiple days or weeks. I include neighbourhoods as an example to discuss how the ideas in this dissertation apply to a type of community that is very different from the BCGs in my investigations. PlayOK and GameCenter were highly transient and featured very low rates of verbal contact. Neighbourhoods, in contrast, are physical communities with relatively stable populations with primarily verbal contact. Neighbourhoods have been studied in depth in traditional community research.

Urban neighbourhood populations can be divided into four groups based on low or high scores in (a) social bonding with others in the neighbourhood and (b) the degree to which they are settled in the neighbourhood (Riger & Lavrakas, 1981). The majority (~66%) are either low or high in both dimensions, leaving a third that are a mixture.

Low socially bonded people in the neighbourhood are roughly equivalent to the informal interactors in other communities. While they may not be active in deciding neighbourhood goals and working to shape the community, they are valuable in the sense that they are a significant portion of the community being shaped, and it is from this group that people become part of the high social bond sub-community. This is another example of how those most active in the community still have a dependency on the rest of the population.

Interaction is likely to be mostly verbal as neighbours that do not know each other well may chat to each other but are less likely to engage in shared activity. However, high social bonded neighbours will often engage in mixed verbal and action-based activities such as pickup sports, walking and running groups, and community events. This is unique amongst the examples here in that the informal interaction is verbal.

Neighbourhoods can be a setting for very high levels of informal leadership. Highly bonded people in the neighbourhood start community organisations for many purposes such as recreational sports, civic projects, or community organisation. In some types of neighbourhoods, such as gated communities, the leadership can be formally appointed and have specific responsibilities and authority. Like other examples, community leadership helps to organise sub-communities, however, in a neighbourhood it is usually linked to a particular purpose.

The example of Neighbourhoods shows how the topics explored in this dissertation are useful in a discussion of a very different type of community. While the particulars of informal interaction, action-based interaction, and leadership are very different from BCG sites, discussing the principles leads to an understanding of the community.

Baby and Pregnancy Community

The Baby and Pregnancy community (BAP) (Ellonen et al., 2007) consists of 38 discussion forums for pregnant women and mothers of young children. The forums cover a range of topics about being pregnant and caring for children. In November 2004, the site was extremely active with 117,500 unique visitors per month and 18,000 messages posted each day. The messages asked

questions, gave answers, were conversational, and were supportive and encouraging. I include BAP as an example because it is an online community with purely text-based verbal communication.

The BAP community has a range of engagement levels present, though they are not all were well supported by the technical environment. Three of the forums are deliberately left open to anonymous posting, while the others require a registered account. Some registered members maintain anonymity by switching accounts. Nearly all members were very protective of their real identities, using obscure pseudonyms for use on the site. Sharing of real identities was saved for special relationships where trust had been established. While there were repeated intimate interactions as groups formed and people followed particular individuals, the majority of interaction was impersonal. I would guess that, as with most forum sites, the majority of the population are lurkers – i.e. they consume but do not produce – which is interacting impersonally. In addition, the exchange of posts is generally informal as the original poster and those replying often do not know each other, have not interacted before, and are unlikely to interact again. However, if someone posted, they almost always received many replies, with a high degree of informational and emotional support. These exchanges led to feelings of community amongst the participants and observers of the exchanges.

Ellonen et al mentioned that an important element of the community was the notion of "impersonal trust", meaning that members would often have a level of trust for another member, even if they did not know them, simply because they were in the same situation. Impersonal trust seems to be a property that would apply more to new mothers than chess players but it is an interesting concept to think about in regard to communities.

BAP is completely verbal and not action-based at all. All the posts are written and are reportedly usually long. Writing is a higher social boundary than non-verbal shared action, so this contributes to the silent majority of lurkers.

Leadership in BAP is largely invisible. There is no formal leadership presence mentioned by Ellonen et al. Some people did mention following particular posters, indicating some informal leadership. Being able to follow and differentiate those people allowed those members to focus and filter the flood of information from this huge forum.

The BAP example is particularly interesting as it shows a community largely based on informal interactions, which still provides strong support to members. In the PlayOK and GameCenter communities, there is no evidence for any sort of informational or emotional support, and it is difficult to imagine that similar exchanges exist in those environments.

Twitter

Twitter is a web site that allows members to post messages of 140 characters or less. These messages are sent to all the people that choose to follow the poster. It is a broadcast service where receivers get to pick and choose what sources they want. There are many software tools on all platforms that allow displaying and arranging received tweets in a variety of ways. I include Twitter because it is an extremely popular example of the current social network communities.

Twitter supports a few levels of engagement – anonymous searching and browsing messages on the web site, registered user reading and sending tweets, and verified account where the account is verified by twitter to be the real person it is claiming to be. However, there is a wide range covered by registered accounts depending on how often people interact on the service and how intimate their relationship might be in other media. Many twitter interactions are highly informal as people will see tweets from other people that they never see again. However, once someone has followed another, that (unidirectional) connection remains until explicitly removed and so the follower can become familiar with the sender and see many of their tweets. This gives a very low barrier to joining twitter.

Twitter is primarily a textual environment. However, I argue that there is a large action-based component to the interaction through sharing objects like links or pictures, and retweeting other people's posts. These are shared experiences and when multiple people share a picture or keep retweeting a post, it creates a link between them with the knowledge that they both appreciated the same thing. Twitter is a mixed verbal/action community.

There is no visible presence of formal leadership on twitter, though they intervene in extreme circumstances such as abuse or bullying. However, there is a very strong informal leadership. Twitter members with high numbers of followers (some but not all verified accounts) are able to perform transactional leadership by rewarding others with retweets and mentions. If one of those people retweets your message, it will be seen by thousands of others. This helps create overlapping sub-communities as different people follow and get familiar with each other.

Twitter is a good example of the value of the large, mostly-silent majority that are engaging in informal interactions. While the focus is usually on the verified celebrities, they only post messages because they know they have hundreds of thousands of followers. The majority of interactions are between people that do not know each other. Out of some of these interactions come stronger relationships. I saw hints of the same type of behaviour happening in PlayOK and GameCenter, though not in the analyses of the log files.

Massively Multiplayer Online Games (MMOGs)

MMOGs are an interesting example to consider in the context of community because they can play many different roles to many different people. The players are motivated by a number of different factors. Yee's (2006) identification and classification of these factors is one of the best-known large empirical studies of motivation. He identified ten factors that he grouped into three categories: Achievement, including advancement, mechanics, and competition; Social, including socialising, relationship, and teamwork; and Immersion, including discovery, role-playing, customisation, and escapism. The factors do not suppress each other so, for example, a player's Achievement motivation does not affect their Social motivation.

Informal interaction is common, where players play next to each other but players are interacting with the environment next to each other and not even through shared action on virtual objects (Ducheneaut et al., 2006b), as they pursue their achievement goals. At the same time, for many players, or even the same players at different times, engage in role-playing or social behaviours (Nardi & Harris, 2006b; Pace et al., 2010) or group together for in-game achievements that are not attainable individually (Bardzell et al., 2012). If these motivations are assumed to be applicable to BCG site members, the dominant motivations are likely to be the advancement and competition factors of the Achievement category. These example also show that there are a range of levels of engagement and furthermore, reflects that MMOGs have a history of originally appealing to mostly achievement motivated players and not being very good at engaging players with other types of motivation (Debeauvais, Nardi, Schiano, Ducheneaut, & Yee, 2011) and, in response have developed strategies for encouraging Achievement players to be more social as well as supporting and retaining Social players. For example, some game goals are only attainable by groups, and so Achievement players group together and they become more integrated with the group through interaction. Social motivations are encouraged through the formation of long-lived groups such as Guilds.

The example of MMOGs shows that, even in an extremely rich virtual environment, the principles of informal interaction discovered in BCGs are still present. MMOGs support and encourage social behaviour and close interaction between players, yet the evidence shows that there is still a large component of individual activity. MMOG research also gives some clues as to the motivations for informally interacting players.

Advice for Designers

There are three design recommendations that arise strongly from this work: first, support multiple levels of social engagement, particularly low levels of verbal interaction; second, provide shared activity; and third, provide many opponents.

Communities Can be Sustained by an Informal and Transient Membership

The studies in chapters 4 and 5 demonstrated that the PlayOK and GameCenter communities were successful and sustaining, even with a large transient population and mainly informal interactions. The discussion above around the theatre audience example illustrated how far this principle can be taken and still result in a sustaining community. This is one of the big findings of this dissertation.

While it appears that informal interactions and transient populations may support communities like those found in BCGs, the BAP forum example (above) shows that emotional support can be based on similar principles. In the forum, nearly all messages were answered and the community was supportive and encouraging, regardless of whether the poster was known or not. An informal trust was established simply by being in the same situation.

In some ways this is good news for designers. For example, much community activity appears to happen even without long established relationships. On the less positive side, it appears to rely on large numbers of people, which is difficult when trying to start a community.

Informal Interaction Communities Require a Large Number of People

A primary finding of Chapter 4 was that an important property of the success of the PlayOK site was always having an opponent available, regardless of the opponent's identity. Chapter 5 showed that it was also true in the much smaller GameCenter community, even though GameCenter had more of a social component (Chapter 6). These results suggest that this property is common to many BCG sites and likely a principle component of their success. Chapter 5 found that smaller BCG communities are less efficient at always providing an opponent. This "critical mass" problem has long been acknowledged as a problem for online communities and Computer-Supported Cooperative Systems in general, e.g. (Grudin, 1994). The lesson for designers is that, if the community is to have an informal interaction component, this component will function better with a larger population.

In the case of BCG communities, one useful strategy may be through unique offerings such as GameCenter's Toguz Kumalak game and new game implementations. These help draw people even without the guarantee of many others being there.

Another approach is suggested in an interview with Steve Huffman, a co-founder of the news site Reddit[20], where he stated that in the site's early days he and other founders created fake accounts to make it appear as if there were many members (Jahn, 2010). For a BCG site, where the apparent population needs to be larger and needs to be available at any time, the next logical step would be to make Artificial Intelligence (AI) agents on the site. This seems like a plausible solution to the problem of not having enough people, as was seen in GameCenter in Chapter 5. The AI agents would be always present and willing to play games and for most of the types of games on BCG sites an AI would be a challenging opponent for all but the best players. In addition, the results shown in this thesis indicate that complex verbal communication is not a requirement. The presence of igBot in GameCenter (discussed above) means that no player should ever lack an opponent and the results in this dissertation indicate that its lack of conversational ability should not be an issue. Yet, as seen in Chapter 5, GameCenter has a higher proportion of transients, apparently due to the lower population and newcomers not always having an available opponent.

Supporting Multiple Levels of Engagement Can Ease Transition into the Community

In both PlayOK and GameCenter most interactions were anonymous and impersonal. These type of interactions provide low cost entry to the community. In a few of the examples discussed above, for example ICC and twitter, there are many other levels of engagement possible beyond the impersonal. The benefit is that members are not only provided with easy entry into the community but can also transition to the level of engagement that they desire from the community.

There are some types of community where it is not desirable to create a smooth transition for people to join. Sites with strict entry requirements and well-defined boundaries may only want to support a single level of engagement. For example, a competitive sport team requires qualification and expects all members to be known and fully engaged.

However, otherwise supporting a wide range of engagements applies widely in many different types of communities. As discussed previously, results about anonymous and impersonal interactions are also likely to extend to some sections of communities in other game types, mostly those motivated by Yee's Achievement category. For those people, in these other types of games, it

[20] https://en.wikipedia.org/wiki/Reddit

is also important to support impersonal and anonymous interactions. In some games – especially those like MMOGs and MRPGs – this requirement will interact in an interesting way with the high degree of customisability of players' in-game representation. This is often a key feature of such games and is often desirable, but it interferes with the ability to interact anonymously.

Designers and researchers should take this into account when building communities and look for the support for it in the site design and its presence in the community behaviour. I re-emphasise the point I made in Chapter 4, that enhancing support for communication or making richer representations of the players might be counterproductive and actually reduce the interactions. Such features are likely to force many people into levels of social engagement than they want.

Members at different levels of engagement are not in competition with each other and often support each other. For example, Twitter celebrities and very active posters on BAP would not post without the (mostly) silent crowds that read what they have written. The people who do post are adding interesting content that encourages others to join and stay and read.

Shared Activity Can Provide a Low Commitment Means of Social Engagement

Brown & Bell (2006) argue that the shared activity of playing computer games together is "pleasurable and a goal in itself" for players. Thus it is not just the formation of social bonds that supports a community, but also members doing things together.

The design of BCG sites is focused on allowing people to play games with others and the results presented here show that is predominantly what people do. One of the strengths of providing a shared activity such as playing games, is that it is an activity that the anonymous and silent majority can still engage in equally. Communities that require a higher degree of effort, even posting a message, often have many "lurkers" (those who consume but do not produce) who are usually seen as undesirable, or at best potential future contributors, e.g. (Lampe, Wash, Velasquez, & Ozkaya, 2010). Lurking is not negative behaviour and is usually associated with becoming familiar with the community (Nonnecke, Andrews, & Preece, 2006).

The low commitment required for shared activity, such as playing a game in the BCG sites, means that more people will engage move beyond lurking. In contrast, engaging in a conversation is often a barrier that requires time and effort to overcome. A low-effort shared activity can be a means of engaging those initially put off by the time or effort. It also supports those with high achievement oriented motivation.

Verbal Communication Supports Coordination of Ambiguous Activities

As shown in Chapter 4, sociable interactions in BCGs are largely action-based. In BCGs, one of the main reasons this works well is that the game rules are simple and well defined and can be codified into the interface.

However, in other game types, such as Multiplayer First-Person Shooters (MFPSs) or MMOs, the timing and actions available at any time point are much less formally defined. Players respond in various ways, such as complex planning and leadership structures (Bardzell et al., 2012) and formalising verbal interactions (Tang et al., 2012). Both approaches include a large amount of verbal communication. Where there is ambiguity of action and show how the more formalised gameplay structure of BCG sites requires less verbal interaction.

If actions were not coded into the BCG interfaces, I imagine there would be more verbal communication as players would be forced to negotiate. For example, if there was no interface for bidding in a card game, the players would have to talk to communicate their bids. This example and the studies of MFPSs and MMOs demonstrate that ambiguity prompts more verbal communication.

It should be noted that this is not necessarily a good thing. Many potential players may be discouraged as they would prefer not to communicate verbally, or are happier with the explicit structure.

Leadership Encourages Traditional Social Sub-Communities

In Chapter 6, I found that there was a traditional social sub-community – the game designers – that built up around Arty's leadership in GameCenter. As others have found, e.g. (Ginsburg & Weisband, 2002b; Koh & Kim, 2003; Williams et al., 2006; Zhu et al., 2012), leadership is important to building and maintaining traditional social communities.

These game designers may have helped to sustain others on the site in three ways. First, they may have helped directly by attracting and providing interactions for other members. Second, just by being around and interacting with each other, they give a sense of community even to those not directly engaged (Blanchard & Markus, 2002). Third, in between engaging in their primary activities, they may interact with newcomers for example by playing games that they only play occasionally. The sub-community is likely to have been important to maintaining the site community over time, most especially as the site was growing. The game designers were there because of and were sustained by Arty's leadership.

However, the benefits of the leadership come with a warning. The results in chapter 6 show that loss of leadership roles can have a strong impact on community activity. An important lesson that reinforces lessons from previous work, e.g. (Pearce & Sims, 2002; Zhu et al., 2012), is the value of distributing leadership tasks. Consider the tasks of 'welcoming newcomers' and 'implementing new games'. The first was shared and so Arty's withdrawal had little impact (at least directly, there were follow-on effects). In contrast, the second can only be performed by Arty, so there was a strong negative effect on the community. The lesson is to spread responsibilities around and avoid a single point of failure.

Limitations

This is a new area and there are many directions to explore. In this thesis I started to investigate some of those directions but there are many that I unable to follow up, either due to managing the scope of the thesis or because of restrictions on the data available. These limitations impact the scope of the conclusions.

A few of the more important limitations are:

1. I only looked at BCG sites. This means that the conclusions are only applicable to BCGs and not to other online communities such as social media sites, discussion forums, and multiplayer games. When I contrasted with these other community types, I made use of information reported in the literature. It would be an interesting to see if the types of relationships and interactions found here exist in other types of online communities, making use of similar data from the communities.
2. I only looked at two BCG sites. This was a necessary constraint for the scope of the thesis but it does mean that the studies need to be replicated before any conclusions can be made about all BCG sites.
3. I only looked at two successful BCG sites. These two sites were long lived and had "made it" in a space that, anecdotally at least, has a high failure rate. Without contrasting with failure cases, there may be other important factors that I did not consider.
4. I had limited interview data with players, and overwhelmingly used log data to draw conclusions. It is possible that players feel very differently about the community than their log behaviour suggests.

5. I was unable to look at chat message content. The content of messages may paint a very different picture of sociability on the sites.

Conclusion

This thesis has identified and started to explore a new type of community. In this chapter I have discussed some of the ways in which those explorations relate to each other, to other BCGs, and to other online communities. Because this is an initial exploration of a novel conception of community, there are mostly questions: How do changes in social structure impact BCG communities? How far can we push these new definitions and still have community? How much can be applied to other online community structures?

However, there are lessons. The most important is that the impersonal, anonymous, and transient interactions are an important foundational component to many communities and should be supported and encouraged.

CHAPTER 8
CONCLUSION

The central problem of this thesis is that designers and researchers have a poor understanding of the characteristics of BCG communities, and how those characteristics are affected by factors that are typically seen as important for community such as size and leadership. Designers do not understand whether the communities function in similar ways to other virtual communities.

To address the problem, I improve understanding of BCG communities by analysing fundamental properties of virtual communities in BCG sites. These analyses are possible because I have log data of community behaviour from two successful BCG sites, recording player information, login-logout activity, movement through the site, sending chat messages, and game playing. Using this information, I study fundamental behavioural properties of virtual communities that are recognised as important to understanding virtual communities: the virtual place, the group of people, social interaction, formation of relationships, and permanence of membership. These investigations can be summarised in the following questions:

1 What behaviour is exhibited by successful examples of BCG community?
2 How do BCG communities of different sizes compare?
3 What role does leadership play in successful BCG communities?

In response to question 1, I found that both successful BCG communities were largely supported by impersonal and anonymous interactions. In these interactions, which were mostly game playing, the identity of an opponent was unimportant; the important factor was to have an opponent available. Once the game was finished, the player moved on to the next game and the next anonymous opponent. Because of this it was not important that there was a high proportion of transient members as players did not reconnect with the same opponents often. There were also very few verbal interactions, though for experienced game players the game moves themselves are a rich form of communication.

Size differences in BCGs did not appear to affect the underlying behaviour substantially but did make the site less efficient at supporting these types of interactions. In both the small and large BCG, I found evidence of the same patterns of behaviour involving many games with different unknown opponents and few verbal interactions. The smaller site showed an even higher proportion of transient members however, suggesting that it was not appealing to as many people. I surmise

that as potential players arrived at the site looking for someone to play against, in many cases there would not be anyone, simply due to the lower numbers on the site.

Leadership can still be an important factor in BCGs, despite their fundamental reliance on impersonal interaction. The leadership roles have a strong effect on sections of the community according to their reliance on the activities of the leader. Leadership activities can also create different reasons for site membership, for example in the GameCenter BCG there was a sub-community around designing games.

Contributions

The main contribution of this research is to provide the first characterisation and analysis of a previously unstudied but important type of virtual community. The new understanding is targeted at designers to aid in building and maintaining BCG virtual communities. The contribution is accomplished by analysing the data from the two BCG sites PlayOK and GameCenter. These two sites provide examples of success in BCGs and can provide useful insights for designers. There are three parts to this contribution:

1. I identified Fundamental community properties of successful BCGs identified through exploration of PlayOK and GameCenter. These properties were: informal interaction; action based socialising; and sociable interaction.
2. I identified primary influence of the size of the community, which is that it is harder to maintain the impersonal interaction in smaller communities.
3. I identified some primary influences of leadership, which are that an active leader can encourage a more traditional sub-community but that sub-community can become dependent on the leader.

There are also three minor contributions:

1. The two datasets, which can be of value to other researchers. As I discovered, it is difficult to obtain data from BCG sites. These sites are similar enough for comparison and yet have some interesting differences.
2. Techniques for visualising community activity
3. Mapping behavioural community definitions to social accounting metrics

Future Work

Throughout this thesis I have included suggestions of potential future work but these suggestions have been associated with the discussion in progress at that time. A larger program of future research is suggested by the behavioural definition of community that I have used in many of the sections of the thesis. This definition consists of five components: a public virtual place, a group of people, social interaction, relationships, and permanence of both site and members. A useful contribution would be to work towards a theoretical framework that incorporates these components. Each of the components exists on a continuum and is influenced by many factors. It would be useful to know the influences, and what communities look like with different "amounts" of components. For example, in Chapter 7, I mentioned several systems that had extremely transient interactions; are these still communities? Also, I discussed the influence of different leadership structures.

There is a distinction between the behavioural components that are under direct control and the emergent behaviour of the community. Of the five community components, only the design of the public virtual place is under direct control. In addition, designers and administrators are able to explicitly control their own in-game interventions (e.g. leadership) and external representations of the site such as advertising or presence on other sites. The other behavioural community elements – the group of people, the social interaction, the relationships, and the permanence of both site and membership – are all emergent properties based.

Some influences are suggested by the research in this thesis. For example, in GameCenter, leadership interventions led to changes in the composition of the group of people. The leadership was targeted at people interested in game design, which led to a niche community around that topic. When this leadership was reduced, the composition of the group of people changed again. One avenue of future work would be to look at other BCG sites, characterise the amount of leadership structure, and compare the community composition to get a picture of the influences.

In another example, the design of both the BCGs studied likely had a strong influence on the social interaction and relationships. Both were designed to prioritise playing games as the primary interaction. Future research could involve building BCG sites that alter design elements such as emphasis on verbal communication or richness of embodiment, to see how those elements change the community interaction.

Other future work is suggested by the limitations listed in the previous chapter:

1. Look for this type of community and type of interactions in other contexts. The ideas I have presented in this thesis may be useful to describing elements of other communities, such as Massively Multiplayer Online Games or movie-watching communities.
2. Look at other BCG sites. The studies here need to be replicated to see how widely the conclusions apply. While I have made an important step in identifying this type of community, it is far from clear as to how widely the properties apply.
3. Look at failure cases. An interesting study would be to compare the properties present in successful BCG sites but not present in sites that fail. These could be analysed in the context of impersonal interactions.
4. Supplement the log data with more interviews and/or chat message content. These sources of information would allow comparing the results from the log files with the perception of the players.

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